

# Mechanical Permit Plans Checklist

# MECH-CHK

2015 Washington State Energy Code Compliance Forms for Commercial Buildings including R2 & R3 over 3 stories and all R1

Revised January 2017

Project Title: 1710 12th Ave		Date: 4/1/2021			
Applicable (yes,no,na)	Code Section	Code Provision	Information Required - Must be in permit documents	Location in Documents	Building Department Notes
<b>Equipment - Sizing, Performance and Type</b>					
NA	C403.1	Exempt process equipment	Identify equipment to be used in manufacturing, industrial or commercial processes that do not provide space conditioning; identify provisions applicable to this equipment per C403.1 exception		
YES	C403.2.1	Load calculations	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	M0.05-7	
YES	C403.2.2	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 taken	EC0.1, M0.2, M0.05, M0.6, M0.7	
YES	C403.2.3 C403.2.3.2 C403.2.13.1	HVAC equipment performance requirements (efficiency)	Provide equipment schedules on plans or complete MECH-EQ forms indicating type, capacity, rated and WSEC minimum efficiencies for all heating and cooling equipment; include supply and OSA cfm's and operating hours for all air systems; identify heating and cooling equipment that does not have a corresponding WSEC minimum efficiency (manufacturer rated)	M0.02	
YES	C405.8 C403.2.14	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 hp, rpm, number of poles and rated efficiency, or exception applied	M0.02	
			For fractional hp motors (1/12 - 1 hp), indicate whether they are an electronically commutated motor, have rated efficiency of at least 70%, or exception taken	M0.02	
YES	C403.2.11.1	Fan power limitation	For all HVAC fan systems that provide heating and / or cooling, provide system total nameplate hp in MECH-FANSYS-SUM form	M0.02	
			For all applicable HVAC systems with total fan motor hp > 5hp, verify fan system motor hp or bhp complies with fan power limits per equations in Table C403.2.11.1(1), provide MECH-FANSYS form for each system	N/A	
NA	C403.2.11.2	Motor nameplate hp	For all applicable HVAC systems with total fan motor hp > 5hp, indicate fan motors specified are the smallest available motor hp size greater than fan bhp, note exceptions taken		
NA	C403.2.11.3	Fan efficiency	For all applicable HVAC systems with total fan motor hp > 5hp, identify in equipment schedule all fans required to comply with fan efficiency grade and indicate rated FEG is ≥ 67, or exception taken; indicate these fans are sized so total efficiency is within 15% of the fan maximum total efficiency		
YES	C403.2.11.4	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 taken; refer to Table C403.2.11.4 (CE-57)	M0.02	
YES	C403.2.13	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 taken; for equivalent method for an HVAC system refer to HVAC System Controls for additional requirements	M0.02	
NA	C403.2.3	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 taken		
NA	C403.4	Large capacity cooling systems	For buildings with ≥ 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 < 66% of the total)		
NA	C403.2.3.1	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		
NA	C403.2.13.1 C403.4.3.2	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		
NA	C403.4.2 C403.4.2.5	Large capacity boiler systems	For single boilers with > 500,000 Btu/h capacity, indicate multi-stage or modulating burner		
			For boiler system (single or multiple) with > 1,000,000 Btu/h capacity, indicate turndown ratio per Table C403.4.2.5 and method (multiple single input boilers, modulating boilers, or combination)		
NA	C403.2.13	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 taken; for equivalent method for a hydronic system refer to Hydronic System Controls for additional requirements		
NA	C403.2.3	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		
NA	C403.2.4.8	Combustion heating equipment	For combustion heating equipment with output capacity > 225,000 Btu/h, indicate modulating or staged combustion control		
YES	C403.2.3.3	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	M0.02	
NA	C403.2.12	Heating outside a building	Indicate systems providing heating in non-enclosed outdoor occupied spaces are radiant systems; refer to HVAC System Controls for additional requirements		
YES	C403.2.7.1	Kitchen exhaust hoods	Indicate on plans the type, duty and exhaust air rate of each kitchen hood, refer to HVAC System Controls for additional requirements	M0.02	
YES	C403.2.4.3	Outdoor supply air, exhaust and relief dampers	Indicate locations of OSA intake, and exhaust and relief outlet dampers on plans; indicate whether dampers are Class 1 motorized, or gravity and exception taken (include leakage rating, cfm/sf); refer to HVAC System Controls for additional requirements for OSA dampers	M0.02	
YES	C403.2.4.3	Return air dampers	Indicate locations of return air dampers that are integral to 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)	M0.02	
YES	C403.2.4.3	Stairway and shaft vent dampers	Indicate location of stairway and shaft vent dampers on plans; verify dampers are Class 1 motorized; refer to HVAC System Controls for additional requirements	M0.02, M1.10	
NA	C403.2.4.4	Zone isolation dampers	For systems serving areas > 25,000 sf or spanning more than one floor, that include areas that are expected to be occupied non-simultaneously; identify isolation zone areas on plans and locations of associated isolation dampers in HVAC distribution system; refer to HVAC System Controls for additional requirements		
NA	C403.2.3.4	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 taken		
<b>Additional Efficiency Package Option, More Efficient HVAC Equipment &amp; Fan Performance - Must comply with all 3 provisions to be eligible</b>					
NA	C406.2.1 C403.2.3	HVAC system selection	To comply with additional efficiency package option, calculate the percentage of heating and cooling equipment in the project (based on output capacity) that do not have a corresponding WSEC listed efficiency; shall be less than 10% to comply		

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NA	C406.2.2 C403.2.3	Minimum equipment efficiency	To comply with additional efficiency package option, indicate that all listed heating and cooling equipment have a rated efficiency that exceeds WSEC listed efficiency by at least 15%		
NA	C406.2.3 C403.2.11.3	Minimum fan efficiency	To comply with additional efficiency package option, indicate rated FEG of stand alone 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		
<b>HVAC System Controls</b>					
YES	C403.2.4.1	Thermostatic controls (thermostats and humidistats)	Indicate locations of thermostatic and humidity control devices and the zones they serve on plans, including perimeter system zones 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	M1.2 - M1.9 N/A N/A	
YES	C403.2.4.1.1	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	M0.02	
YES	C403.2.4.1.2	Deadband	Indicate zone thermostatic controls configured with 5°F minimum deadband for systems that control both heating and cooling	EC0.1, M0.02	
NA	C403.2.4.1.3	Setpoint overlap restriction (thermostats)	If separate heating and cooling systems with separate 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		
YES	C403.2.4.2 C403.2.4.2.1 C403.2.4.2.2	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 programmable controls); note exceptions taken	M0.02, M2.1- M2.28	
NA	C403.2.4.2.3	Automatic (optimum) start	Indicate system controls that adjust equipment start time required to bring each area served up to design temperature just prior to scheduled occupancy		
YES	C403.2.4.3	Outdoor supply air dampers	Indicate automatic controls configured to close OSA damper during unoccupied equipment operation; not including economizer cooling, night flush or IMC required OSA / exhaust	M0.02	
YES	C403.2.4.3	Stairway and shaft vent dampers	Indicate method of activation of stairway and shaft vent dampers (fire alarm or interruption of power)	M0.02	
NA	C403.2.4.4	Zone isolation controls	For systems serving areas > 25,000 sf or spanning more than one floor, that include areas that are expected to be occupied non-simultaneously; indicate controls that allow for independent space conditioning of isolation zones; or exception taken		
NA	C403.2.12	Heating outside a building	Indicate occupancy sensing or timer switch controls configured to automatically shut off heating system when area served is unoccupied		
NA	C403.2.4.5	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		
NA	C403.2.4.6	Freeze protection system controls	Indicate automatic controls to shut off system when outdoor temperature exceeds 40°F, or conditions protect fluid from freezing		
NA	C403.2.4.9	Group R1 hotel / motel guest rooms	For hotels and motels with over 50 guest rooms, indicate automatic controls serving guest rooms that are capable of setback (heating) and set-up (cooling) of temperature setpoint by at least 5°F; indicate control method - activated by room entry or occupancy sensor		

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YES	C403.2.4.10 C403.2.4.11	Group R2 / R3 dwelling units, Group R2 sleeping units	For primary space conditioning system, indicate 5-2 programmable thermostats capable of two setback periods per day; for all thermostats indicate purpose (heating only, cooling only, or both), required temperature range and at minimum a 10°F deadband; or exception taken	M2.1- M2.28	
YES	C403.2.6 C403.2.11.4	Ventilation	Indicate method of ventilation air delivery (natural or mechanical) for each zone  If mechanically delivered, indicate that 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 taken  If delivered via natural ventilation, identify required elements per IMC including minimum openable area to the outdoors or qualifying adjoining spaces	M1.1-1.09; M2.1- M2.28  M1.1-1.09; M2.1- M2.28  NA	
NA	C403.2.6.2	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 OSA > 3,000 cfm, and / or the system has airside economizer or automatic modulating OSA damper; indicate OSA controls are configured to provide demand controlled ventilation or provide supporting documentation for applied exception		
NA	C403.2.6.3	Occupancy sensors	For gyms, classrooms, auditoriums and conference rooms > 500 sf, indicate occupancy-based OSA control when space is unoccupied and method (closes OSA damper or shuts-off equipment); or alternate means provided to automatically reduce OSA when space is partially occupied		
NA	C403.2.6.4 C403.2.6.4.1	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)		
YES	C403.2.6.4 C403.2.6.4.2	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 taken	M0.02, M1.1-M1.3	
NA	C403.2.7.1	Kitchen exhaust hoods	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; if applicable, indicate that direct make-up air to each hood does not exceed 10% of hood exhaust For kitchens with total hood exhaust exceeding 2,000 cfm, indicate exhaust air rate per Table C403.2.7.1 and compliance method (DCV, energy recovery, or transfer air that would otherwise be exhausted)		
NA	C403.2.7.2	Laboratory exhaust systems	Refer to Systems Requiring Energy Recovery for requirements		
YES	C403.2.13	Variable flow capacity - HVAC system fans	For HVAC fan motors ≥ 7.5 hp, indicate method of variable flow control (VSD, or equivalent control method that reduces design air volume by 50% at 1/3 static design pressure); note exception taken	M0.02	
YES	C403.3.1	DX air handler variable cooling control (Under Integrated Economizer)	For DX air handlers with economizer and 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 control method (cooling capacity controlled in response to space temperature, space temperature controlled by modulating supply airflow, or both)	M0.02  N/A	
YES	C403.2.11.5	Fan airflow control	For DX air handling units with cooling capacity ≥ 65,000 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) 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 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 taken	M0.02  N/A  N/A	
NA	C403.2.4.12	DDC system capabilities	Provide central and zone level DDC controls as required based on system application, capacity or size thresholds and other qualification per Table C403.2.4.12.1 Identify all DDC system input / output control points; indicate capability for trending and graphical display		
<b>Ducting Systems</b>					
YES	C403.2.8.1 C403.2.8.3	Duct construction	Indicate on plans that all ductwork is constructed and sealed per IMC  For OSA ductwork, also indicate on plans that ductwork meets air leakage requirements per C402.5 and vapor retarder requirements per the IBC	M0.01  M0.01	
YES	C403.2.8.3	Duct pressure classifications	Identify location of low, medium and high pressure ductwork on plans	M0.01	
NA	C403.2.8.3.3	High pressure duct leakage test	Indicate high pressure duct leakage testing requirements on plans; provide test results to jurisdiction when completed		

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YES	C403.2.8.1 C403.2.8.2	Duct insulation	For supply and return ductwork located in unconditioned space or outdoors, indicate R-value of insulation on ductwork on plans; identify climate zone; note exceptions taken	M1.10	
			For supply ductwork located in conditioned space, identify if design supply temperature is < 55°F or > 105°F and indicate R-value of insulation on this ductwork on plans; note exception taken	NA	
			For OSA ductwork, shafts and plenums, indicate R-value of insulation on these elements on plans per Table C402.1.3 for steel-framed walls; note exception taken	M0.02	
<b>Piping Systems</b>					
NA	C403.2.9	Piping insulation	Indicate design temperature range of fluid conveyed in piping and thickness of insulation (in inches) on hydronic piping plans; or exception taken		
NA	C403.2.9.1	Piping insulation exposed to weather	Indicate method of protection of pipe insulation from damage / degradation on hydronic piping plans		
<b>Economizers</b>					
NA	C403.3	Air economizer required	Identify in equipment schedules on plans or in MECH-EQ forms all cooling systems requiring air economizer controls Provide MECH-ECONO form indicating systems utilizing air economizer exceptions, including those with water-side economizer in lieu of air economizer; indicate on plans eligible exception(s) taken and measures to comply with exception(s)		
NA	C403.3.1	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		
NA	C403.3.2	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		
NA	C403.3.3.1	Air economizer capacity	Indicate modulating OSA and return air dampers are configured to provide up to 100% OSA for cooling		
NA	C403.3.1 C403.3.3.2	Integrated air economizer	Verify mechanical cooling controls are interlocked with air economizer controls so the outside air damper remains in 100% open position when mechanical cooling is also required to meet the cooling load, until the leaving air temperature is < 45°F For systems with cooling capacity ≥ 65,000 Btu/h, verify that control of economizer dampers is not based only on mixed air temperature; or exception taken		
NA	C403.3.3.3	Air economizer high limit controls	Indicate high limit shut-off control method and required high limit per Table C403.3.3.3		
NA	C403.3.4.1	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 OSA temperatures		
NA	C403.3.4.2	Water economizer maximum pressure drop	Indicate pressure drop across precooling coils and heat exchangers in water economizer system do not exceed pressure drop limit		
NA	C403.3.1	DX air handling equipment control	For DX air handlers with economizer and cooling capacity ≥ 65,000 Btu/h, refer to HVAC System Controls for requirements		
NA	C403.2.4.7	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		
<b>Systems Requiring Energy Recovery</b>					
YES	C403.5.1	Energy recovery (ER) - ventilation / exhaust systems	For systems with design OSA > 5,000 cfm, or design supply air cfm and % OSA exceeding the values in Tables C403.5.1(1) or (2), indicate exhaust air ER method; or exception taken with supporting calculations	M0.02	
			For rooms served by multiple systems with aggregate design OSA > 5,000 cfm, or aggregate design supply air cfm and % OSA exceeding the values in Tables C403.5.1(1) or (2), indicate exhaust air ER method; or exception taken with supporting calculations	N/A	
			Indicate ER rated effectiveness that increases OSA enthalpy by ≥ 50% based on delta between OSA and return air enthalpies at design conditions	N/A	
NA	C403.2.7.2	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; ER effectiveness (min 25°F); or alternative method per exception (VAV exhaust, semi-conditioned makeup, or CERM calculation)	N/A	
NA	C404.10.4 (under C404.11)	Pools and permanent spas exhaust systems (energy recovery)	For buildings with pools or spas with water surface area > 200 sf, indicate exhaust air ER method and use of waste heat (preheat ventilation air, pool water or service hot water); or exception taken	N/A	
			Indicate ER system has the rated effectiveness and is configured to decrease the exhaust air temperature at design conditions by ≥ 36°F	N/A	
NA	C403.5.2	Energy recovery - steam condensate systems	For buildings with on-site steam heating systems, indicate condensate water ER	N/A	
			For buildings that use off-site generated steam where condensate is not returned to the source, indicate on-site condensate water ER	N/A	

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NA	C403.5.3	Energy recovery - cooler / freezer condensers	For buildings with food service, meat or deli departments that have $\geq 500,000$ Btu/h of remote refrigeration capacity for coolers / freezers, indicate condenser ER and use of captured energy (service water heating, space heating, or dehumidification reheating)	N/A	
			For buildings with $\geq 40,000$ sf conditioned floor area and with $\geq 1,000,000$ Btu/h of remote refrigeration capacity for coolers / freezers, indicate condenser ER and use of captured energy for service water heating and also for space heating, or dehumidification reheating	N/A	
NA	C403.5.4	Energy recovery - condenser systems	For buildings with 24-hour operation and with $> 1,500,000$ Btu/h of heat rejection capacity and design service hot water load $> 250,000$ Btu/h, indicate condenser ER to pre-heat service water; or exception taken. 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)	N/A	

### Hydronic System Controls

NA	C403.2.13 C403.4.2.7	Variable flow control - hydronic system pumps	For hydronic system pump motors $\geq 7.5$ hp, indicate method of variable flow control (VSD or equivalent method that requires $\geq 30\%$ design wattage at 50% design fluid flow); note exception taken Identify whether hydronic coils have DDC controls and associated manner of pump speed control (differential pressure, zone hydronic demand, etc)		
NA	C403.2.5 C403.4.2.4	Hydronic system setback and part load controls	For boilers that provide building heating, indicate controls that provide heating water temperature setback based on outdoor temperature For heating and chilled water systems $\geq 300,000$ Btu/h, indicate systems are configured to automatically reset supply water temperature based upon demand; or exception taken. If system pump motor hp $\geq 3$ hp, also indicate controls automatically reduce flow by $\geq 50\%$ . For chilled water systems ( $\geq 300,000$ Btu/h, pump motor hp $\geq 3$ hp) that serve water-cooled unitary air conditioners, indicate VSD or staged pumps in chilled water system and heat rejection loop that reduce pump flow so that one control valve is nearly wide open, or to maintain a minimum differential pressure; or exception taken		
NA	C403.4.2	Boiler sequencing	Indicate automatic controls that sequence operation of multiple boilers		
NA	C403.4.6	Hot gas bypass limitation	For cooling equipment with hot gas bypass, provide either multiple step unloading or continuous capacity modulation; indicate bypass capacity per Table C403.4.6		
NA	C403.4.2.2	Two-pipe changeover systems	Indicate changeover deadband (min 15°F), heating / cooling mode scheduling and changeover temperature range (limit 30°F)		
NA	C403.4.2.6	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		
NA	C403.2.13.1.1 C403.4.3.1.1 C403.4.3.1.2	Heat rejection equipment - variable flow control	For cooling towers with fan motors $\geq 7.5$ hp, indicate VSD and method to adjust fan speed (adjusted based on leaving fluid temperature or condenser temperature / pressure of heat rejection device) For multiple-cell heat rejection equipment with VSD, indicate controls that ramp all fans in unison		
NA	C403.4.3.3	Heat rejection equipment - cooling tower flow turndown	Indicate open-circuit cooling towers with multiple pumps or VSD control are designed so all cells can be run in parallel		
NA	C403.4.2.3.1	Water loop heat pump - deadband	Indicate capability of central equipment to provide minimum 20°F water supply temperature deadband between heat rejection and heat addition modes; or exception taken		
NA	C403.4.2.3.2.1	Water loop heat pump - heat rejection equipment, Zone 4	Indicate type of cooling tower (open- or closed-circuit) in equipment schedule; indicate method used to limit system heat loss when heat rejection is not needed		
NA	C403.4.2.3.2.2	Water loop heat pump - heat rejection equipment, Zone 5	For open- or closed-circuit cooling towers, provide a heat exchanger that separates the cooling tower and heat pump loop		
NA	C403.4.2.3.3	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		

### Dedicated Outdoor Air Systems (DOAS) - Optional through 6/30/16, Prescriptive 7/1/2016

NA	C403.6 C403.6.3	Dedicated outdoor air systems	For buildings with office, retail, education, library and fire station spaces, identify these spaces on plans; indicate that ventilation air in each occupied space is provided via a DOAS system; or document compliance with C403.6.3 Impracticality; or exception taken (buildings complying with C402.4.1.4 or C406.6 may not utilize exceptions)		
NA	C403.6.1	Energy recovery ventilation with DOAS	For all DOAS systems, indicate exhaust air ER method; or exception taken with supporting calculations. Indicate ER rated effectiveness that increases OSA enthalpy by $\geq 50\%$ based on delta between OSA and return air enthalpies at design conditions.		
NA	C403.6.2	Heating / cooling system controls with DOAS	Indicate 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 equipment 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		

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NA	C402.4.1.4 C403.6	Increased prescriptive maximum vertical fenestration area with DOAS	Indicate that all occupied, conditioned spaces are served by a DOAS per C403.6		
<b>Additional Efficiency Package Option, Dedicated Outside Air Systems (DOAS)</b>					
NA	C406.6	Building provided with DOAS	To comply with additional efficiency package option, indicate that 90% or more of all occupied, conditioned spaces are served by a DOAS per C403.6		
<b>Multiple Zone Air Systems</b>					
NA	C403.4.4	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		
NA	C403.4.4	VAV systems serving multiple zones	Provide equipment schedules on plans or MECH-EQ form that list all VAV air terminals and types For each air terminal include: maximum airflow rates for primary supply air during zone peak heating and zone peak cooling; maximum airflow during reheating, recooling or mixing; minimum airflow rate to maintain required ventilation, and the basis for these values; if IMC or ASHRAE 62.1 multiple zone equation is basis for minimum flow rates, provide calculation on plans		
NA	C403.4.4.1	Single duct VAV terminal units	Indicate single duct terminal units are configured to reduce primary supply air before reheating or recooling		
NA	C403.4.4.2	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		
NA	C403.4.4.1.1 C403.4.4.1.2	VAV system static pressure sensors - 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 $\leq 1.2$ 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		
NA	C403.4.4.3	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 taken		
NA	C403.4.4.4	VAV system supply air reset	Indicate controls automatically reset supply air temperature in response to building loads or outdoor air temperature; or exception taken		
<b>Multiple Zone HVAC Systems, High Efficiency VAV - Required for systems utilizing C403.6 DOAS Exception 2, must comply with all 16 provisions</b>					
NA	C403.7, Item 1	Air economizer	Indicate system is configured for 100% air economizer operation and complies with all related economizer requirements per C403.3 (without economizer exceptions)		
NA	C403.7, Item 2	Direct digital controls (DDC)	Provide DDC controls for all components of system; identify all DDC system input / output control points; indicate capability for trending and graphical display		
NA	C403.7, Item 3	Outdoor airflow measurement and reduction	For systems with minimum OSA > 2,500 cfm, indicate outdoor airflow monitoring station that measures OSA intake under all load conditions; indicate control sequence that increases or reduces system OSA cfm based on VAV terminal feedback of ventilation efficiency (per C403.4.4.3 without exceptions) or DCV (per C403.2.6.2)		
NA	C403.7, Item 4	Supply airflow measurement	For systems with minimum OSA > 2,500 cfm, indicate supply airflow monitoring station capable of measuring supply air delivered to VAV terminals under all load conditions		
NA	C403.7, Item 5	Zone isolation and maximum area served	Verify maximum area served by a single HEVAV system is $\leq 50,000$ 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 C403.2.4.4		
NA	C403.7, Item 6	Interior / exterior zone design supply air temperature	Verify that VAV terminals serving interior cooling driven loads are sized per design supply air temperature that is 5°F higher than VAV terminals serving exterior zones		
NA	C403.7, Item 7	Maximum air terminal inlet velocity	Identify air terminals with minimum primary airflow setpoints > 50% of maximum setpoint in equipment schedule or MECH-EQ form; indicate air terminal inlet velocity does not exceed 900 fpm		
NA	C403.7, Item 8	Sequence of operation	Indicate DDC system sequences of operation are designed and configured per ASHRAE GPC 36		
NA	C403.7, Item 9	Maximum allowable system brake horsepower	Verify fan system bhp is $\leq 90\%$ of the bhp limit per Option 2 equation in Table C403.2.11.1(1), provide MECH-FANSYS form for each system		
NA	C403.7, Item 10	Fan-powered terminal unit motor and control	Indicate all series and parallel terminal fans have electronically commutated motors; 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 is $\leq 66\%$ of peak design air flow or provide supporting documentation for applied exception		

# Mechanical Permit Plans Checklist

**MECH-CHK**

2015 Washington State Energy Code Compliance Forms for Commercial Buildings including R2 & R3 over 3 stories and all R1

Revised January 2017

<b>Project Title:</b> 1710 12th Ave			<b>Date:</b> 4/1/2021		
The following information is necessary to check a permit application for compliance with the mechanical systems and equipment requirements of the Washington State Energy Code, Commercial Provisions.					
Applicable (yes,no,na)	Code Section	Code Provision	Information Required - <i>Must be in permit documents</i>	Location in Documents	Building Department Notes
NA	C403.7, Item 11	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; verify all other zones are served by single duct terminal units		
NA	C403.7, Item 12	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, based upon the VAV air handling unit OSA ventilation fraction		
NA	C403.7, Item 13	High occupancy space controls	For spaces > 150 sf with occupant density ≥ 25 people / 1000 sf, indicate space is served by a dedicated terminal unit with DCV control that resets terminal unit ventilation setpoint; also indicate occupancy sensor control that automatically reduces minimum ventilation to zero and <b>sets back room heating and cooling setpoints by ≥ 5°F</b>		
NA	C403.7, Item 14	Dedicated HVAC systems	For server, electronic equipment, telecom or similar spaces with cooling loads > 5 W/sf, indicate spaces are served by independent HVAC systems that are separate from HPVAV systems serving rest of building; indicate dedicated HVAC systems have air economizer controls or energy recovery per C403.3 Exception 9		
NA	C403.7, Item 15	Central plant efficiency	Indicate whether systems are served by a high efficiency heating water plant, or a high efficiency chilled water plant If complying via high efficiency heating water plant: Indicate all VAV terminals have hydronic heating coils served by heating water system with either gas-fired boiler(s) with thermal efficiency ≥ 90%, air-to-water heat pumps, or heat recovery chillers 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 C403.2.3(7) (note water-cooled IPLV is max, all others are min); indicate smallest chiller or compressor in plant is ≤ 20% of total plant capacity, or provide thermal storage sized for ≤ 20% of total plant capacity		
NA	C403.7, Item 16	Fault detection and diagnostics	Indicate DDC system includes a fault detection and diagnostics (FDD) system configured to monitor operation and provide fault reporting of required parameters for all VAV air handlers and VAV air terminal units in the HPVAV system		
<b>HVAC Equipment Energy Use Metering</b>					
YES	C409.3.1	HVAC equipment energy use metering	For new buildings > 50,000 sf and building additions > 25,000 sf, verify 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	EC0.01	
<b>Documentation and System Specific Requirement To Support Commissioning</b>					
YES	C408.2	Scope of mechanical systems commissioning	Indicate that all mechanical systems, equipment, and controls for which the WSEC requires control functions and / or configuration to perform specific functions are required to be commissioned; 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 eligibility for exception	EC0.02	
YES	C403.2.10 C408.1.1 C408.1.2 C408.1.4.2 C103.6	Commissioning requirements in construction documents	Indicate in plans and specifications that Cx per C408 is required for all applicable mechanical systems; Include general summary with at a minimum of Items 1 thru 4 of the Cx plan per C408.1.2 including: narrative description of activities, 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); Include in general summary that a Cx project report or Compliance Checklist (Figure C408.1.4.2) shall be completed by the Certified Cx Professional and provided to the owner prior to the final mechanical inspection.	EC0.02	
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	EC0.02	
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	EC0.02	
YES	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	N/A	
YES	C408.2.3	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	EC0.02	
<b>Project Close Out Documentation</b>					
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 compliance forms and calculations	EC0.02	