5.6 Technical Specification: Ductless Heat Pumps with Variable Refrigerant Flow

Small Premium Project Type:

Ductless heat pump (DHP) system with a variable flow capacity, inverter drive compressor installed as the primary HVAC system in a commercial building. These systems are also commonly called “mini-split” systems.

Description:

DHPs are split system, electric air source heat pumps that vary cooling and heating capacity based on the required thermal load. Each DHP condensing unit (CU) can provide variable refrigerant flow to one to four indoor air handling units (AHUs with coils or “heads”) using a variable capacity compressor (inverter driven). The indoor AHUs provide heating and cooling to thermal zones directly by fan-forced, air flow. Ductwork is not used to convey the tempered air. Due to variable cooling/heating capacity control, a high part-load efficiency compressor, flexible thermal zoning, elimination of heat losses from ductwork, and high efficiency air transport, DHP systems minimize overheating and overcooling while using less energy than conventional air conditioning (e.g. central forced air) and baseboard heating HVAC systems. New and existing commercial buildings installing DHP systems can qualify for a tax credit.

DHP systems installed as the primary central HVAC system serving small commercial spaces under 7,000 square feet are eligible for this tax credit. DHP systems can include multiple outdoor condensing units. At a minimum, eligible DHP systems may have as few as one outdoor condensing unit with one indoor air handling unit or “head”.

Eligible projects can include:

1) Projects where a DHP system is installed as the primary HVAC system in a newly constructed commercial space
2) Complete replacement of an existing HVAC system with a new DHP as the primary HVAC system in an existing or renovated commercial space.

Eligible DHP systems will be installed to serve spaces that have a peak connected electrical load of less than 5.0 watts per square foot and that do not include energy-intensive space usages such as: commercial kitchens, commercial refrigeration or process loads. Ventilation for the spaces served must be in accordance with Oregon’s building code. Ventilation can be provided by the DHP system or a separate dedicated outside air system.

While this tax credit is reserved for small commercial spaces, this can include rental properties and other landlord-owned, commercial spaces. Residential buildings owned by a private party are not eligible.

Minimum Operation:

Operate as a business at least 2,200 hours annually or be occupied as a conventional residential property.

Equipment Type, Capacity and Performance:

The combined capacity of eligible equipment must not exceed the ranges defined within this specification. Individual condensing units must meet minimum energy efficiency requirements listed for the nominal size of the unit.

ENERGY PERFORMANCE REQUIREMENTS

Qualified DHPs must meet or exceed the following energy performance standards achieved at Air Conditioning Heating and Refrigeration Institute (AHRI) testing conditions.

Ductless heat pump systems with an inverter driven compressor must meet or exceed the performance requirements below or the energy performance requirements in the Oregon REACH code as required for the building type.

Equipment Type	Nominal Size Category***	Sub Category (Configuration)	Minimum Energy Efficiency*
Air-cooled heat pumps (Cooling Mode)	<65,000 Btu/h	Ductless with inverter driven compressor	15.0 SEER or 12.5 EER
	≥65,000 Btu/h through <135,000 Btu/h	Ductless with inverter driven compressor	12.0 EER and 12.5 IEER
	135,000 Btu/h through <216,000 Btu/h	Ductless with inverter driven compressor	12.0 EER and 12.5 IEER
Air-cooled heat pumps (Heating Mode)	<65,000 Btu/h	Rated at nominal heating capacity at 47°F and provide at least 50% of the nominal heating capacity at 17°F.	10.0 HPSF
	≥65,000 Btu/h through <135,000 Btu/h	47°F db/43°Fwb Outdoor Air	3.4 COP
		17°F db/15°Fwb Outdoor Air	2.4 COP
	135,000 Btu/h through <216,000 Btu/h	47°F db/43°Fwb Outdoor Air	3.2 COP
		17°F db/15°Fwb Outdoor Air	2.1 COP

Notes:

* All listed performance ratings are stated at AHRI test conditions as defined in OEESC Chapter 6.

** Deduct 0.2 from the required minimum EER and IPLV for units with a heating section other than electric resistance heat.

*** The nominal size applies to the condensing unit. 1 cooling ton = 12,000 btu/h

Installed system equipment must meet the following requirements:

- Set the heating and cooling set points with a minimum five degree dead-band.

- HSPF of 10.0 or greater.
- The DHP system must be a split system heat pump employing inverter-driven outdoor compressor units with variable-speed indoor blower fans.
- DHPs are installed in spaces that are individually metered by an electric utility or have the ability to separate electric usage from adjoining businesses.
- Provide manufacturer's training.
- Line sets must be enclosed in line set covers.
- Units with adjustable dead-band settings must be set to a minimum of 5 degrees or to factory recommended settings.
- The units must be installed without integral electric resistance heat.
- R410A refrigerant only.
- Have a minimum five (5) year warranty on the variable flow, compressor.

Eligible DHP equipment must meet or exceed the performance of the energy performance ratings required in this technical specification. All eligible projects must demonstrate performance compliance by submitting an AHRI certificate of performance for the manufacturer make and model of the equipment that has been installed.

QUALITY SYSTEM DESIGN AND INSTALLATION REQUIREMENTS FOR BUILDING AC PROJECTS
All installed AC systems must be sized, selected and installed per the requirements detailed in ANSI/ACCA 5 QI – 2010 (HVAC Quality Installation Specification; see www.acca.org/quality for a free PDF copy). All DHPs must be installed by a qualified contractor who has been recognized as a Master Installer by the NW Ductless Heat Pump Project and has received installation training from the manufacturer of the DHP equipment being installed. All DHPs must be installed by a qualified contractor who has completed the Northwest Ductless Orientation and has received installation training from the manufacturer of the DHP equipment being installed.

Building heat gain/loss load calculations must be performed in accordance with OEESC by the installing contractor or a qualified third party, based on post-construction conditions. Such load calculations must be comply with the Air Conditioning Contractors of America (ACCA) Manual N or J (for residential buildings used for commercial purposes) ASHRAE approved load calculation methodology. ODOE will require a copy of the building load calculations (used to size/select the installed equipment capacity) as part of the documentation submitted.

Incentive Estimate Worksheet:

The incentive worksheet shown in the following schedule is the prescribed tax credit amounts that small premium projects can receive for a DHP system with a variable refrigerant flow compressor (i.e. inverter driven) serving a small commercial space. Please note that the incentive is based on the size of the condensing unit serving the indoor units. A single project can have multiple DHP condensing units as long as the units are sized based on the load calculation methods identified previously and the cumulative total doesn't exceed 18 nominal cooling tons.

System Configuration	A. Incentive for Retrofit/Replace AC Project ($/ton)	B. Nominal Cooling Capacity of Condensing Unit to be Installed (Tons)	C. Number of Indoor Units Served by Condensing Unit	D. Total Eligible Incentive ($) A x B = D
Ductless with Inverter Drive Compressor	$1,180			

Note: 1 cooling ton = 12,000 btu/h

Total (B)

Total (D)