

Application Note 2020

Adding VRF to COMcheck

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Introduction

This Application Note provides an overview related to the addition of VRF projects to COMcheck.

What is COMcheck?

COMcheck is a computer software program produced by the U.S. Department of Energy that is used to verify that a building design meets the requirements of various building codes.

The program can be downloaded from the following website:

<http://www.energycodes.gov/comcheck>

COMcheck 4.1.1.0 supports all VRF systems (air source, water source, heat recovery etc.) when using ASHRAE 90.1-2010 (or later) or 2012 IECC (or later) as the code basis. Not all states have adopted these codes as their basis, but in order to best model VRF it's best to use one of the aforementioned codes, or a later version. While the program has the 2012, 2015 & 2018 IECC as available codes, these codes don't contain a minimum equipment efficiency section dedicated to VRF (VRF systems tested to AHRI 1230). Therefore, when using IECC as the basis of code and modeling a VRF system the program doesn't list minimum efficiencies for any system size. In older codes the user will be forced to use Heat Pump, Split System (AHRI 340/360 standard) to best model VRF.

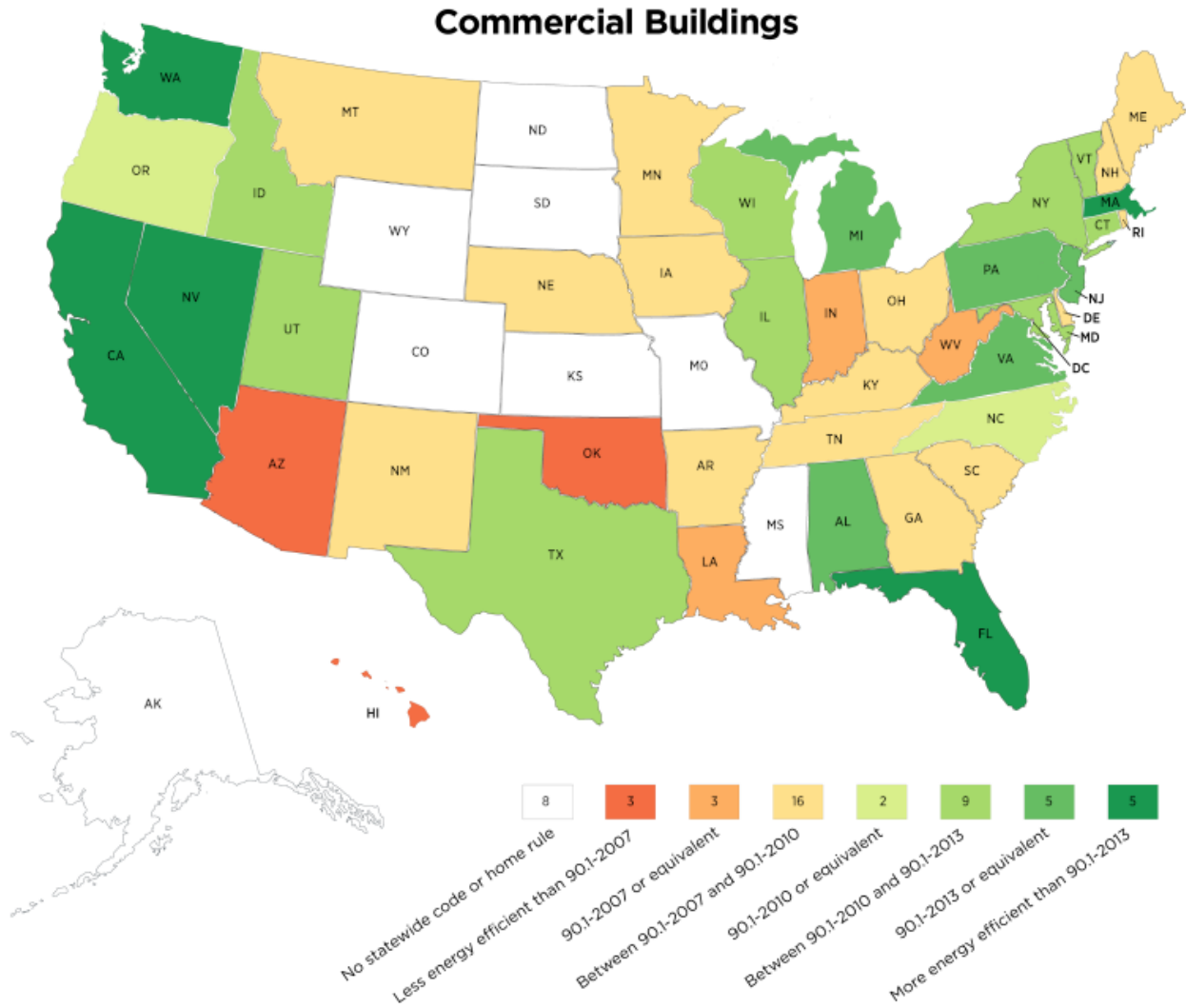
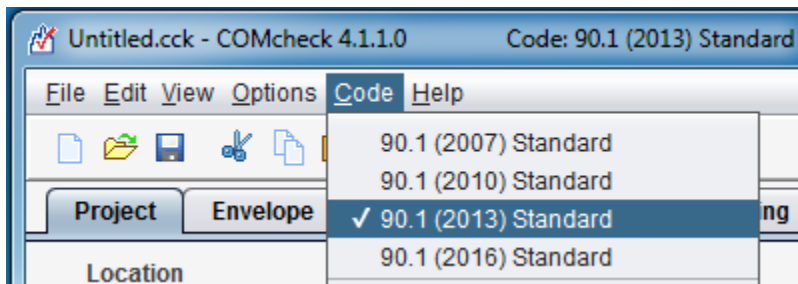


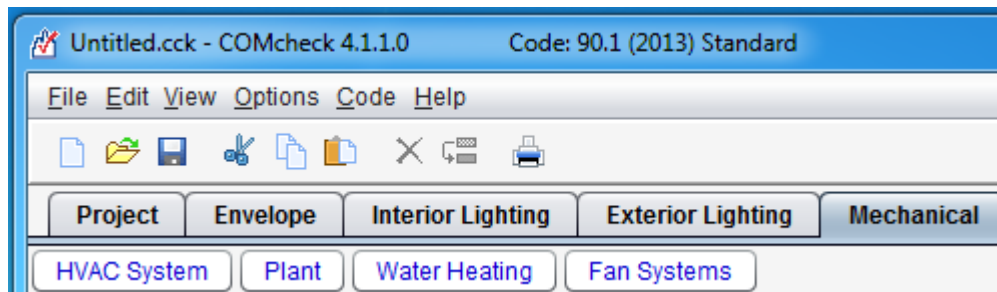
Figure 1: Code Adoption by state

How to set up a VRF system in COMcheck.

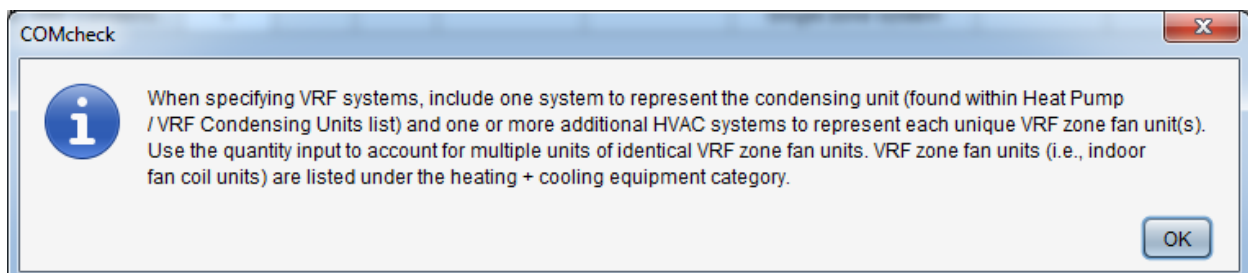
1. Change the code basis to ASHRAE 90.1 (2013) Standard (or later) or 2012 IECC (or later). This example uses ASHRAE 90.1 (2013) throughout:



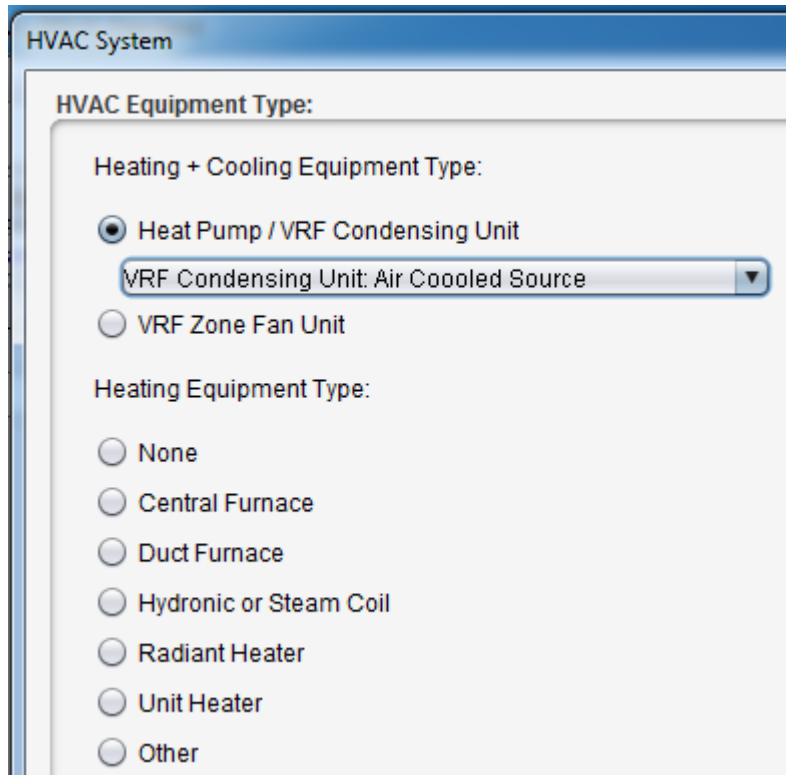
2. Add an HVAC system by clicking the 'Mechanical' tab and then the 'HVAC System' button:



COMcheck supports both VRF outdoor and indoor unit modeling as noted below. For this example we'll select our outdoor unit first. Note that as a VRF heat pump system can provide both heating and cooling you only need to select the VRF system once.



- Click 'Heat Pump / VRF Condensing Unit' and select your VRF system from the drop down menu:



HVAC System

HVAC Equipment Type:

Heating + Cooling Equipment Type:

- Heat Pump / VRF Condensing Unit
 - VRF Condensing Unit: Air Cooled Source
- VRF Zone Fan Unit

Heating Equipment Type:

- None
- Central Furnace
- Duct Furnace
- Hydronic or Steam Coil
- Radiant Heater
- Unit Heater
- Other

- By default, the minimum efficiency column will appear as HSPF (for heating) and SEER (for cooling). Systems under 65 kBtu/h nominal capacity use HSPF and SEER while systems greater than or equal to 65 kBtu/h use COP and EER

In order to change the efficiency metrics, the heating and cooling capacities of the system must be manually added.

Capacity	Cap. Units	Fuel Type/ Heat Source	Condenser Type	System Details	Fan System Details	Proposed Efficiency	Eff. Units	Minimum Efficiency
				Single zone system				
0	kBtu/h					0.00	HS...	7.70 HSPF
0	kBtu/h					0.00	SE...	13.00 SEER

Capacity	Cap. Units	Fuel Type/ Heat Source	Condenser Type	System Details	Fan System Details	Proposed Efficiency	Eff. Units	Minimum Efficiency
				Single zone system				
80	kBtu/h					0.00	COP	3.30 COP
72	kBtu/h					0.00	EER	11.00 EER

5. Next you can add your VRF indoor units. As noted in COMcheck's popup you can represent multiple indoor units of the same capacity using the quantity field. In this example, the fields would represent two 36,000 Btu/h indoor units:

HVAC System Plant Water Heating Fan Systems					
	Component	System Type	Quantity	Capacity	Cap. Units
	▼ Building				
1	▼ HVAC System 1	Heat Pump: VRF Condens...	1		
2	Heating	Heating mode		80	kBtu/h
3	Cooling	Cooling mode		72	kBtu/h
4	▼ HVAC System 2	HVAC System	1		
5	Cooling equipment	VRF Zone Fan Unit	2	36	kBtu/h

6. The final step is to add the fan system details to the fan coil unit:

▼ HVAC System 2	HVAC System	1				Single zone system	Select F...		
▼ Cooling equipment	VRF Zone Fan Unit	2	36	kBtu/h			None Select Fan System... Configure Fan Systems...		--

▼ **Fan System ID:** FAN SYSTEM 1 **Areas Served:**

Fan System Compliance Options

Method: Motor Nameplate HP Brake HP (BHP) Flow control devices installed on exhaust/return to meet health, safety environmental air pressure requirements in hospital, vivarium or laboratory systems.

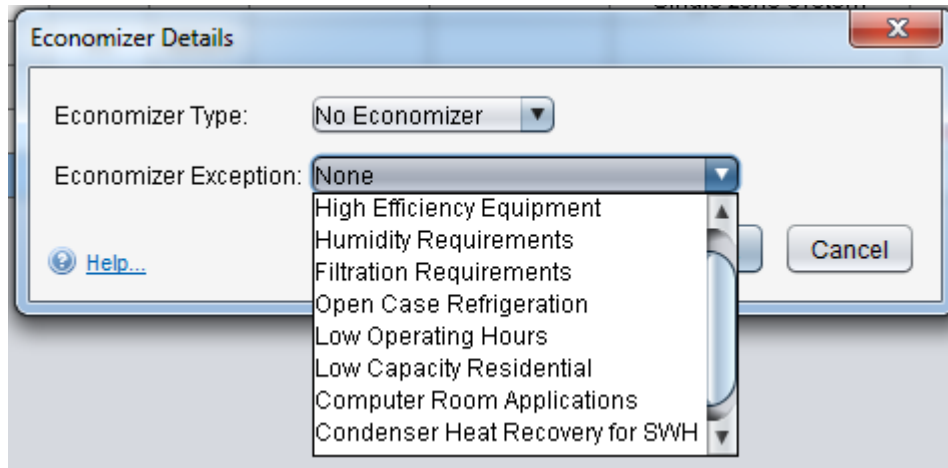
Fans

	Fan ID	Fan Type	Fan Control	Design Air Volume (CFM)	Motor Nameplate HP	Fan Efficiency Grade
1	FAN 1	Select ...	Select ...	0.0	0.0	0.0

FAN 1 : Fan type is unspecified

Proposed Max. Allowed
Motor Nameplate HP

If using ASHRAE 90.1 any indoor unit 54 kBtu/h or above will automatically add an economizer. Select the relevant economizer exemption, if applicable, from the drop list:



Users may be drawn to the ‘High Efficiency Equipment’ exemption given the nature of VRF being referred to as high efficiency. This exemption refers to Table 6.5.1-3 in ASHRAE 90.1 (2013), which Mitsubishi Electric equipment can meet depending on climate zone and the system’s rated efficiency from the VRF minimum efficiency requirements. Mitsubishi air source equipment is rated with a part load metric (IEER) and as such the required improvement percentage should be applied to this metric. While COMcheck doesn’t reference the IEER minimum efficiency in the Mechanical section it is referenced in the Requirements section based upon the size of the unit that’s added to the Mechanical section. For example, based upon the 72,000 Btu/h VRF air source unit that was added earlier in this walkthrough you can see the minimum IEER reflects this capacity, based on the ASHRAE 90.1 (2013) minimum efficiency tables.

