

Application Note 2020: Adding VRF to COMcheck

Author **Matthew Sooy** | Sr. Mechanical Engineer – NE Business Unit

Reference Documents **<https://www.energycodes.gov/comcheck>**

Table of Contents

Introduction.....	3
What is COMcheck?.....	3
How to set up a VRF system in COMcheck.....	5

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 4.0.2.8 supports all VRF systems (air source, water source, heat recovery etc.) when using ASHRAE 90.1-2010 (or later) or 2012 IECC as the code basis. Not all states have adopted these codes as their basis, but in order to best model VRF in the program they will have to use one of the above codes. While the program has the 2012 IECC as a code basis, the 2012 IECC technically doesn't contain a minimum equipment efficiency section dedicated to VRF. Therefore, when using 2012 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 to best model VRF.

Current Commercial Building Energy Code Adoption Status

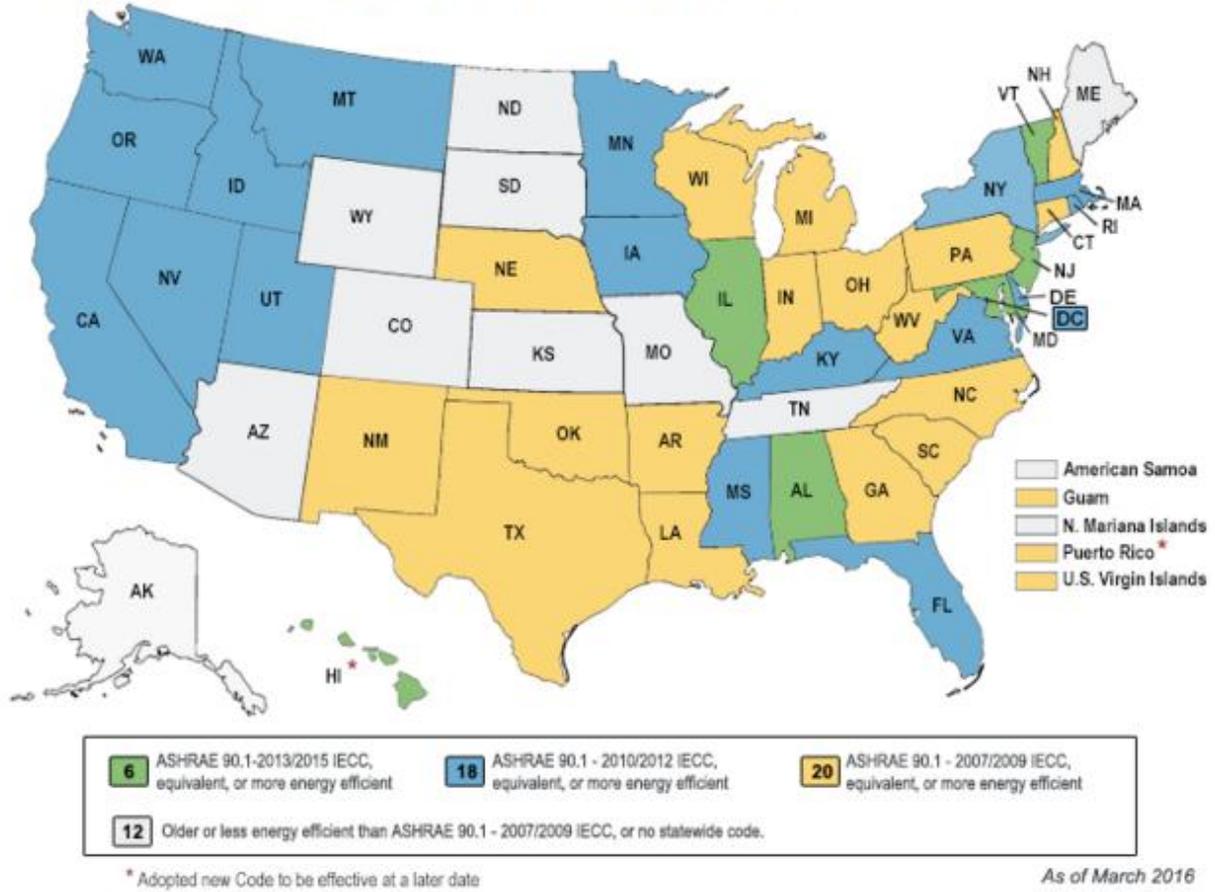
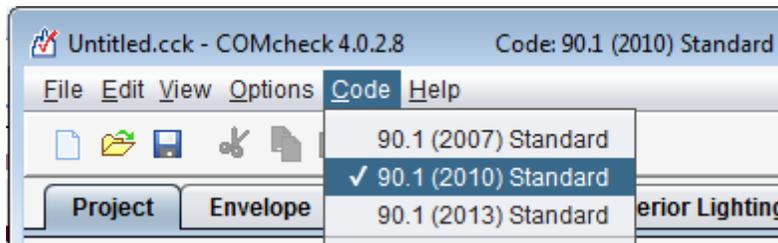


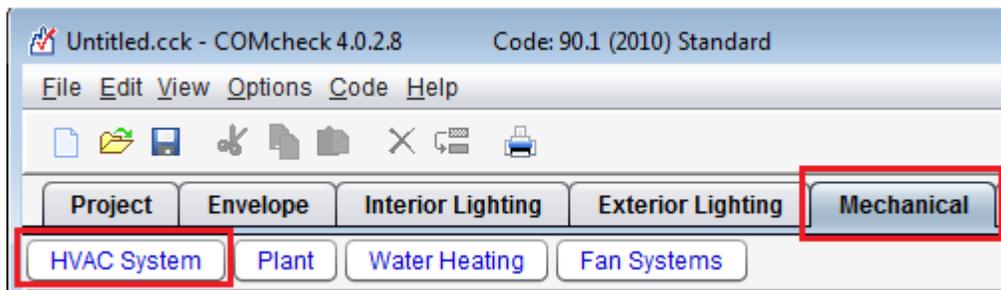
Figure 1: Code Adoption by state

How to set up a VRF system in COMcheck.

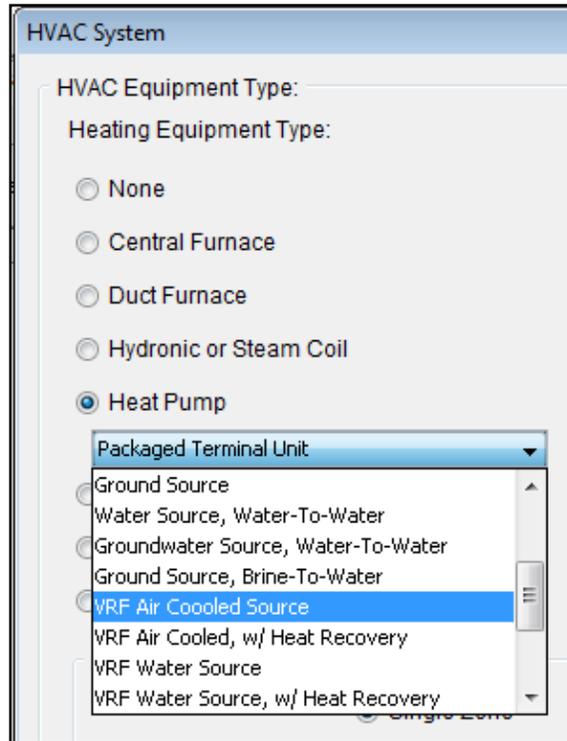
1. Change the code basis to ASHRAE 90.1 (2010) Standard or 2012 IECC. This example uses ASHRAE 90.1 (2010) throughout:



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



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



- 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

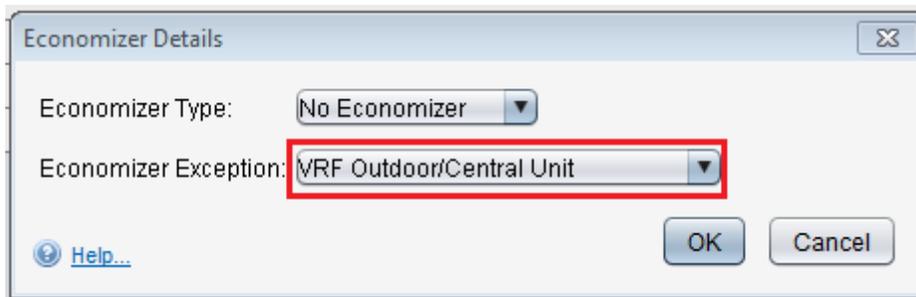
In order to change the efficiency metrics, the heating and cooling capacities of the system must be manually added.

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

APPLICATION NOTES

Capacity	Cap. Units	Fuel Type/ Heat Source	Condenser Type	System Details	Fan System Details	Proposed Efficiency	Eff. Units	Minimum Efficiency
				Single zone system	None ▾			
80	kBtu/h					0.00	COP	3.30 COP
72	kBtu/h			Air Economizer ...		0.00	EER	11.00 EER

Systems over 54 kBtu/h will automatically add an economizer as the program doesn't account for multi split systems where a single outdoor unit serves multiple indoor units. ASHRAE 90.1 (2010) Section 6.5.1 states that economizers are not required if "Individual fan-cooling units with a supply capacity less than the minimum listed in Table 6.5.1A for comfort cooling applications...". Table 6.5.1A states that an economizer is only required outside climate zone 1a & 1b if the fan coil unit is greater than or equal to 54,000 Btu/h. Therefore, if none of the fan coil units in the VRF system are larger than 54,000 Btu/h an economizer should not be required. COMcheck has added an economizer exemption of 'VRF Outdoor/Central Unit' which can be used for compliance in applications such as this.



Users may be drawn to the 'High Efficiency Equipment' exemption. This exemption refers to Table 6.3.2 in ASHRAE 90.1 (2010), which Mitsubishi Electric equipment can meet depending on climate zone and the system's rated efficiency in comparison to Table 6.8.1J VRF minimum efficiency requirements. Mitsubishi air source equipment is rated with a part load metric (i.e. IEER) and as such the required improvement percentage should be applied to this metric. Because COMcheck only uses COP and EER as the minimum efficiency metrics the program applies the improvement percentage to EER which our equipment will fail to meet the majority of the time. Until a resolution is provided we can only recommend that you explain to your code official that the economizer requirements should be exempt per Table 6.3.2. As this exemption is dependent on climate zone please refer to the specific improvement percentage for your project location when determining exemption status. The 'VRF Outdoor/Central Unit' exemption can be used with the discrepancy noted outside the program.

As a final note, the 'VRF Outdoor/Central Unit' exemption does not prove compliance on its own. This exemption was introduced to differentiate VRF outdoor and indoor units. This exemption alone does not prove compliance. Depending on the code the VRF indoor unit may still require an economizer.