ADDENDA

ASHRAE Addendum d to
ASHRAE Guideline 41-2020

Design, Installation and Commissioning of Variable Refrigerant Flow (VRF) Systems

Approved by ASHRAE on February 2, 2023.

This addendum was approved by a Standing Guideline Project Committee (SGPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the guideline. Instructions for how to submit a change can be found on the ASHRAE® website (www.ashrae.org/continuous-maintenance).

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b. participation in the next review of the Guideline,
c. offering constructive criticism for improving the Guideline, or
d. permission to reprint portions of the Guideline.

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FOREWORD

The control section of the guideline is changed to update and clarify how the VRF internal system controls work both as stand-alone and when interfaced with third-party automation and controls systems and devices. Figure 5 is updated to show typical BAS configurations interfacing with typical VRF layout, as well as Web/ Internet interface. A firewall is shown to put infancies on the need to secure Web-connected systems.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum d to Standard 41-2020

Modify Section 6.8 as shown. Delete existing Figure 5 and replace with new Figure 5 as shown.

6.8 System Controls. The installation of a complete system of manufacturers' controls is required for a VRF system to work properly. VRF systems are just that, a system, not applied components like dampers, fans, or coils. That said, various levels of system control can be applied by third-party control and automation vendors. The minimum manufacturers' controls needed for a properly operating VRF system should be specified with the VRF system, not in the building automation and control specification. Only the manufacturer can determine these minimum requirements for system operation, including all manufacturers' equipment needed to interface the third-party controls to the VRF System.

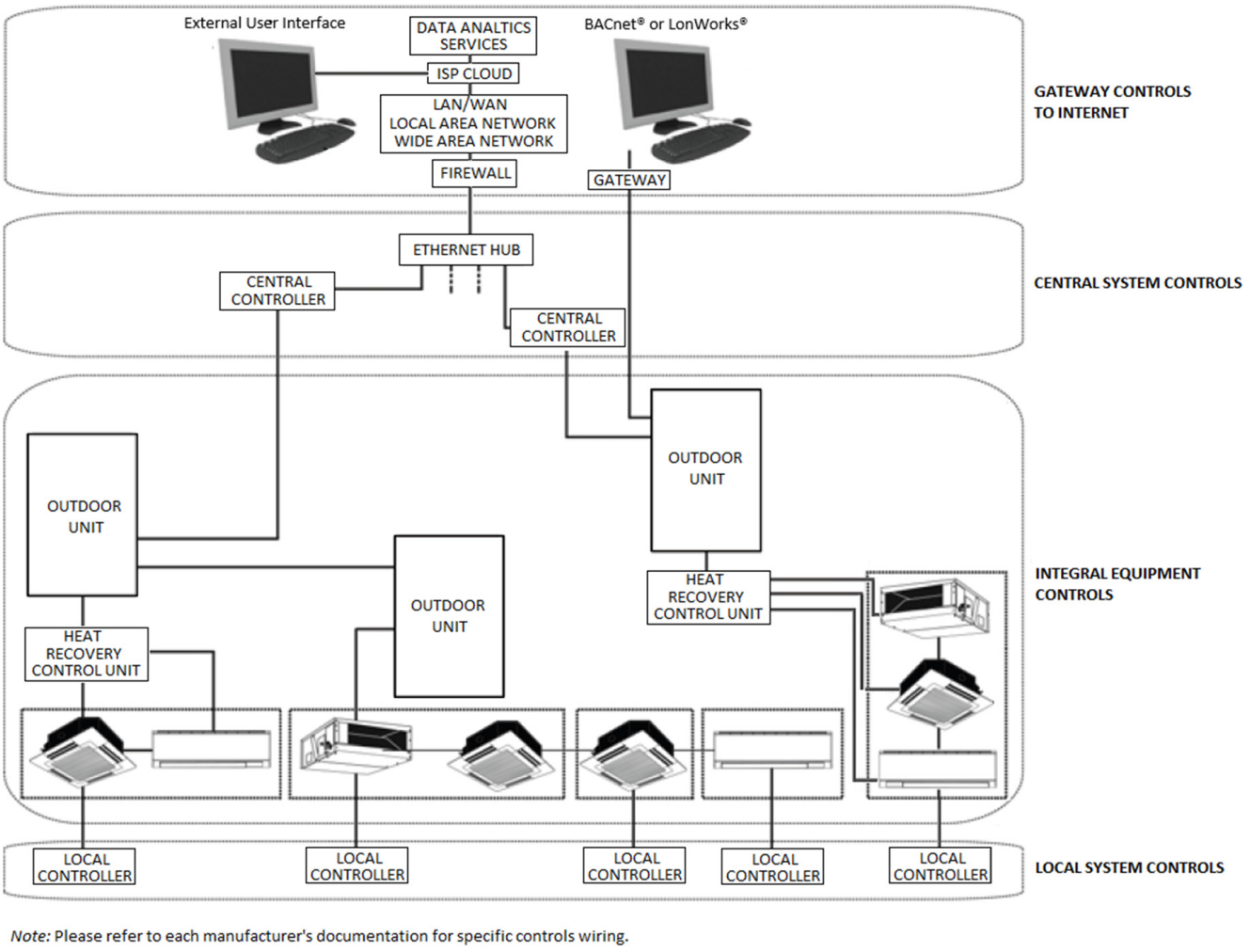
Varying levels of manufacturer and third-party controls exist for VRF systems and include options for local control, central system control, and remote system monitoring and data analytics. Manufacturers' ~~These~~ controls and controllers are typically proprietary to each specific manufacturer; however, ~~some~~ third-party controls ~~vendors~~are ableto ~~developing controls~~ to integrate directly with VRF manufacturers' proprietary controls at different ~~systems (see Figure 5).~~locations within the manufacturers' control system. Figure 5 shows the typical third-party building automation system interface.

Local control options include wired and wireless controllers to control the VRF terminal units with varying levels of programmability. Wireless controllers typically offer the ability to change mode, set point, and fan speed. Wire remote controllers are available as programmable or nonprogrammable. The nonprogrammable controllers provide similar control options to the wireless controller but on a larger controller interface. Programmable controllers typically include options for scheduling, setback, set-point temperature range control, and additional menus for programming and diagnostics of the equipment. Manufacturers' ~~All~~ local controllers should be able to display any error codes for their connected units. A third-party option at this level can be used by installing the manufacturers' thermostat interface, and then installing a smart thermostat by a third-party vendor. This could be a very good option for homes, apartments, and smaller offices that want a single controller for multiple units or VRF systems. Wi-fi enabled smart thermostats can provide the monitoring and alarming for applications that do not have any technical staff.

Central controllers provide the ability to connect multiple systems to a central point, and some manufacturers incorporate the means to integrate other building equipment, either through analog or digital interlocks or over BACnet if the central controller provides a BACnet client capability. These controllers provide the ability to control and monitor their connected units, either through a built-in interface or via a workstation or remote computer if the controller is added to the building's IT network or Web connected.

Most manufacturers have available building management system (BMS) gateways, typically for BACnet, LON, and Modbus. These gateways can be for systems integration or can be smaller communication cards that are field installed at the terminal unit level. These gateways typically include multiple points per terminal unit and usually provide all the functionality that the end user has at the local controller level.

When Web connecting the VRF system, the owner has the ability to use data analytics systems in the cloud to monitor and analyze the VRF system. Advantages of cloud-based systems are their ability to scale with the systems and buildings owned, and the data storage needed to do in-depth data analytics over a longer time period. On-site building automation systems like those shown in Figure 5 can perform the same functions, but the computer and storage requirements can be significant and expensive to maintain. Finding



Note: Please refer to each manufacturer's documentation for specific controls wiring.

Figure 5 Control system architecture.

the best fit, from smart thermostats to large-scale system control and data analytics, is important to cover early in the design so that the system meets owner expectations.

Informative Note: Service and maintenance personnel should receive manufacturer specific training on the VRF system controls to be qualified to operate and maintain the equipment, which may increase the cost of the maintenance.

POLICY STATEMENT DEFINING ASHRAE'S CONCERN FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES

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ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the Standards and Guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive Technical Committee structure, continue to generate up-to-date Standards and Guidelines where appropriate and adopt, recommend, and promote those new and revised Standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date Standards and design considerations as the material is systematically revised.

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As an industry leader in research, standards writing, publishing, certification, and continuing education, ASHRAE and its members are dedicated to promoting a healthy and sustainable built environment for all, through strategic partnerships with organizations in the HVAC&R community and across related industries.

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