GUIDELINE

ASHRAE Guideline 41-2020

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

Approved by ASHRAE on January 27, 2020.

This Guideline is under continuous maintenance 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).

The latest edition of an ASHRAE Guideline may be purchased from the ASHRAE website (www.ashrae.org) or from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail: orders@ashrae.org. Fax: 678-539-2129. Telephone: 404-636-8400 (worldwide), or toll free 1-800-527-4723 (for orders in US and Canada). For reprint permission, go to www.ashrae.org/permissions.

 ISSN 1049-894X

SPECIAL NOTE

This Guideline was developed under the auspices of ASHRAE. ASHRAE Guidelines are developed under a review process, identifying a Guideline for the design, testing, application, or evaluation of a specific product, concept, or practice. As a Guideline it is not definitive but encompasses areas where there may be a variety of approaches, none of which must be precisely correct. ASHRAE Guidelines are written to assist professionals in the area of concern and expertise of ASHRAE's Technical Committees and Task Groups.

ASHRAE Guidelines are prepared by Project Committees appointed specifically for the purpose of writing Guidelines. The Project Committee Chair and Vice-Chair must be members of ASHRAE; while other committee members may or may not be ASHRAE members, all must be technically qualified in the subject area of the Guideline.

Development of ASHRAE Guidelines follows procedures similar to those for ASHRAE Standards except that (a) committee balance is desired but not required, (b) an effort is made to achieve consensus but consensus is not required, (c) Guidelines are not appealable, and (d) Guidelines are not submitted to ANSI for approval.

The Senior Manager of Standards of ASHRAE should be contacted for

a. interpretation of the contents of this Guideline,
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.

DISCLAIMER

ASHRAE uses its best efforts to promulgate Standards and Guidelines for the benefit of the public in light of available information and accepted industry practices. However, ASHRAE does not guarantee, certify, or assure the safety or performance of any products, components, or systems tested, installed, or operated in accordance with ASHRAE's Standards or Guidelines or that any tests conducted under its Standards or Guidelines will be nonhazardous or free from risk.

ASHRAE INDUSTRIAL ADVERTISING POLICY ON STANDARDS

ASHRAE Standards and Guidelines are established to assist industry and the public by offering a uniform method of testing for rating purposes, by suggesting safe practices in designing and installing equipment, by providing proper definitions of this equipment, and by providing other information that may serve to guide the industry. The creation of ASHRAE Standards and Guidelines is determined by the need for them, and conformance to them is completely voluntary.

In referring to this Standard or Guideline and in marking of equipment and in advertising, no claim shall be made, either stated or implied, that the product has been approved by ASHRAE.

CONTENTS

ASHRAE Guideline 41-2020
Design, Installation, and Commissioning of Variable Refrigerant Flow (VRF) Systems

NOTE

Approved addenda, errata, or interpretations for this guideline can be downloaded free of charge from the ASHRAE website at www.ashrae.org/technology.

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

Guideline 41 was developed by ASHRAE to fill a need for information and to provide guidance relating to the design, installation, and commissioning of variable refrigerant flow (VRF) systems.

The intent of this guideline is to expand on the basic information currently provided in ASHRAE Handbook—HVAC Systems and Equipment, *Chapter 18, "Variable Refrigerant Flow." In particular, enhanced guidance on installation, commissioning, start-up, and operation is provided.*

1. PURPOSE

This guideline provides a procedure for the design, installation, and commissioning of variable refrigerant flow (VRF) systems.

2. SCOPE

2.1 This guideline provides the procedures and design factors a design engineer should consider; the requirements and installation factors the installing contractor should consider; and the performance, commissioning, and operational factors the contractor and maintenance personnel should consider for a variable refrigerant flow (VRF) system.

2.2 This guideline is intended for use with nonresidential building systems (including, but not limited to, hotels, office buildings, hospitals and other health care facilities, assisted living facilities, schools and universities, commercial buildings, industrial buildings, etc.) and centralized heating/cooling systems in multifamily residential buildings. This guideline is not intended for use with low-rise, single-family, residential buildings.

2.3 This guideline is intended for use by design engineers, installing contractors, owners, operators, users, maintenance personnel, and equipment manufacturers.

2.4 This guideline applies to the design, installation, and commissioning of VRF in new buildings and to the retrofit and renovation of existing buildings.

3. DEFINITIONS AND SYMBOLS

3.1 Definitions

air, outdoor: see ANSI/ASHRAE Standard 62.1[1].

Basis of Design: a document that records the concepts, calculations, decisions, and product selections used to meet the Owner's Project Requirements (OPR) and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

building diversity: the relationship between the sum of the peak loads versus the block load.

capacity:

> ***capacity ratio:*** the nominal capacity of the indoor units (IDUs) in operation at a given time in relation to the nominal capacity of the outdoor unit (ODU).
>
> ***combination ratio:*** the nominal capacity of the IDUs compared to the nominal capacity of the ODU.
>
> ***connected capacity:*** the nominal capacity of the IDUs combined in a system compared to the nominal capacity of the ODU in the same system.
>
> ***full capacity:*** the capacity of the system when all IDUs and ODUs are operated in the same mode at their rated capacity, expressed in Btuh (W).
>
> ***heating capacity:*** the rate of heat that the equipment adds to the conditioned space or heat transfer fluid in a defined interval of time, expressed in Btuh (W).