© ASHRAE. Per international copyright law, additional reproduction, distribution, or transmission in either print or digital form is not permitted without ASHRAE's prior written permission.

CONTENTS

ASHRAE Guideline 41-2023
Design, Installation, and Commissioning of Variable Refrigerant Flow (VRF) Systems

SECTION	PAGE
Foreword	2
1 Purpose	2
2 Scope	2
3 Definitions and Symbols	2
4 Variable Refrigerant Flow Overview	7
5 Feasibility for VRF System Design	10
6 Design for VRF Systems	20
7 Installation Phase	34
8 VRF System Start-Up, Commissioning, and Operations	41
9 Normative References	43
Informative Appendix A: Addenda Description	45

Preview

NOTE

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

© 2023 ASHRAE
180 Technology Parkway · Peachtree Corners, GA 30092 · www.ashrae.org · All rights reserved.
ASHRAE is a registered trademark of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

© ASHRAE. Per international copyright law, additional reproduction, distribution, or transmission in either print or digital form is not permitted without ASHRAE's prior written permission.

(This foreword is not part of this guideline. It is merely informative and does not contain requirements necessary for conformance to the guideline.)

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.*

The 2023 edition of the guideline includes the following key updates:

- *New guidance for modeling an HVAC system that includes variable-refrigerant-flow (VRF) equipment*
- *Clarification of how the VRF internal system controls work both as stand-alone and when interfaced with third-party automation and controls systems and devices*
- *Additional commentary on proper methodology for complying with outdoor ventilation requirements when using VRF systems*
- *Updates to climate zone and seismic survey maps*

For a full list of changes in the 2023 edition, see Informative Appendix A.

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, expressed in Btuh (W), when all IDUs and ODUs are operated in the same mode at their rated capacity.

Preview