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CONTENTS

ASHRAE Guideline 22-2025
Instrumentation for Monitoring Central Chilled-Water Plant Efficiency

SECTION	PAGE
Foreword	2
1 Purpose	2
2 Scope	2
3 Definitions	3
4 Utilization	3
5 Chilled-Water Plant Types and Instrumentation	3
6 Data Gathering and Trending	11
7 Calculations	12
8 References	17
Informative Appendix A: Example Instrument Specification Table	18
Informative Appendix B: Converting Efficiency Metrics	20
Informative Appendix C: Uncertainty Impacts on Measurement Requirements	22
Informative Appendix D: Data Gathering and Trending	26
Informative Appendix E: Example Specification Language	27
Informative Appendix F: Example Application	42
Informative Appendix G: Examples of Analyzed Data	51
Informative Appendix H: Bibliography	56

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.

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(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 22 was developed by ASHRAE to provide a source of information on the instrumentation and collection of data needed for monitoring the efficiency of an electric-motor-driven central chilled-water plant. A minimum level of instrumentation quality is established to ensure that the calculated results of chilled-water plant efficiency are reasonable. Several levels of instrumentation are developed so that the user of this guideline can select the level that suits the needs of each installation.

The basic purpose served by this guideline is to enable the user to continuously monitor chilled-water plant efficiency in order to aid in the operation and improvement of that particular chilled-water plant, not to establish a level of efficiency for all chilled-water plants. Therefore, the effort here is to improve individual plant efficiencies and not to establish an absolute efficiency that would serve as a minimum standard for all chilled-water plants.

It is recognized that there are different needs for monitoring the efficiency of a chilled-water plant. In most cases, the principal objective is to maintain and improve the efficiency of the chilled-water plant. There are also cases where greater accuracy is desired for monitoring chilled-water plant efficiency. The instrumentation section allows the user to determine the required accuracy for the application.

The user of this guideline should be aware that the quality of the instrumentation directly affects the results obtained and, therefore, the accuracy of the chilled-water plant efficiency. As a result, special attention should be given to both the selection and proper installation of instrumentation in order to ensure that the expected result is delivered.

Chilled-water plant efficiency is expressed in different terms. This guideline uses the term for coefficient of performance (COP). While the guideline uses COP, it is understood that kW/ton is another common metric for chilled-water plant efficiency. Informative Appendix B of this guideline provides the information necessary to convert chilled-water plant efficiency between different units of measure. Also, in Informative Appendix E, an example specification is provided for designers of chilled-water plants who wish to incorporate the monitoring of COP or kW/ton into specifications for new plants or modifications of existing plants.

It should be pointed out that this guideline does not offer any information on the design of a chilled-water plant. It is applicable to all electric-motor-driven chilled-water plants regardless of their configuration or types of chillers, cooling towers, pumps, and other parasitic electric chilled-water plant loads. This guideline is designed to help plant managers and operators achieve and maintain a desired level of efficiency for their chilled-water plants.

This is a revision of ASHRAE Guideline 22-2012. This guideline was prepared under the auspices of ASHRAE. It may be used, in whole or in part, by an association or government agency with due credit to ASHRAE. Adherence is strictly on a voluntary basis and merely in the interests of obtaining uniform standards throughout the industry.

The changes made for the 2025 revision are as follows:

- *Revised purpose and scope*
- *Added example for thermal storage (e.g., ice storage)*
- *Revised figures of example chilled-water plants*
- *Updated terminology related to uncertainty of measurements and calculated results*
- *Updated references*
- *Minor editorial changes*

1. PURPOSE

This guideline defines recommended methods to determine chilled-water plant thermal load, energy use, and efficiency.

This guideline defines the following:

a. Recommended measurement systems and calculation methods to determine energy consumption and thermal flows for cooling and heating
b. Procedures for acquiring test data and calculating system efficiency

2. SCOPE

2.1 This guideline applies to the following:

a. Chilled-water plants using any type of liquid-chilling system as defined in Section 3
b. Chilled-water plants using any liquid, as defined in Section 3, to transfer thermal energy

Preview