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ANSI/ASHRAE Standard 205-2023
Representation of Performance Data for HVAC&R and Other Facility Equipment

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FOREWORD

Mechanical equipment uses fuel and/or electricity and emits carbon during operation. Simulation models allow prediction of these impacts given information about how the equipment performs under all conditions. The lack of detailed equipment performance data in readily-usable forms has hampered the application of building simulation models since their invention in the 1960s and 1970s. Data are often not available or published in inconsistent formats, forcing simulation users to resort to default information and/or time consuming (and error-prone) reformatting.

Standard 205 addresses this deficiency by defining common data models and serialization formats for facility equipment performance data, allowing automated exchange among data sources (manufacturers), simulation models, and other engineering applications. The formats and procedures specified by Standard 205 are developed under ASHRAE and ANSI consensus processes with participation of equipment manufacturers, application software developers, and engineering practitioners. The intent is that all data publishers write common-format data files and all application software include procedures to read files using that format. Standard procedures will improve the accuracy and consistency of model results relative to the mix of correlation and application-specific approaches traditionally used.

Standard 205 defines the term representation to mean such a data file. Specifically, a representation is a Concise Binary Object Representation (CBOR) file conforming to a JSON schema defined by a representation specification – a human-readable (text) document that defines data models and formats for an equipment type. Representation specifications are included in Standard 205 appended as an open-ended set. Conceptually, a representation specification has three parts:

- ***Documentation** provides narrative text, schematic(s), references, and other information that explain the equipment and how it is modeled. This material is aimed at human readers to support correct data generation and use. Additional documentation may be available at https://data.ashrae.org/standard205.*
- ***Data model** rigorously specifies the data groups and data elements that identify the performance of the equipment. The ASHRAE 205 JSON schema provides a machine-processable equivalent statement of the data model, allowing automated reading, writing, and validation of data files and is available on-line at https://data.ashrae.org/standard205/schema.html.*
- ***Verification and application rules** set forth logic for identifying data errors and/or using data as intended. Such rules are to be manually implemented in application software.*

The main body of Standard 205 provides rules and definitions used for generating representation specifications. This includes data groups that are common to all representation specifications, requirements for the structure of a representation specification, common definitions such as abbreviations, and informative material. This portion of the main body can be viewed as a meta-standard in that it specifies how to produce a representation specification.

The structure of Standard 205 and how it is applied are shown in Figure 1.

Examples helpful for understanding the form and application of Standard 205 are found in Informative Appendix A and on-line at https://data.ashrae.org/standard205/examples.html.

Standard 205 is intended to support the following use cases –

- ***Data Publication.** Data publishers use representation specifications to guide implementation of data writing and testing software that produces correctly formed representation files.*
- ***Application Development.** Application software developers use representation specifications to guide implementation of software that correctly reads representation data. Such implementations may include verification tests, and developers may use representation specification example data for testing purposes.*
- ***Data Application.** Application software users use representation specifications to understand and check representation data. Data exchange will generally be automated, but the availability of representation specifications facilitates additional data review when needed.*

Standard 205 does not define or restrict distribution schemes for representation files. Data publishers may establish distribution policies that fit their business needs and are free to employ mechanisms such as encryption or digital signatures to control availability. Some organizations may provide publicly accessible representation files. For example, organizations may provide generic representations to support energy code compliance analysis.

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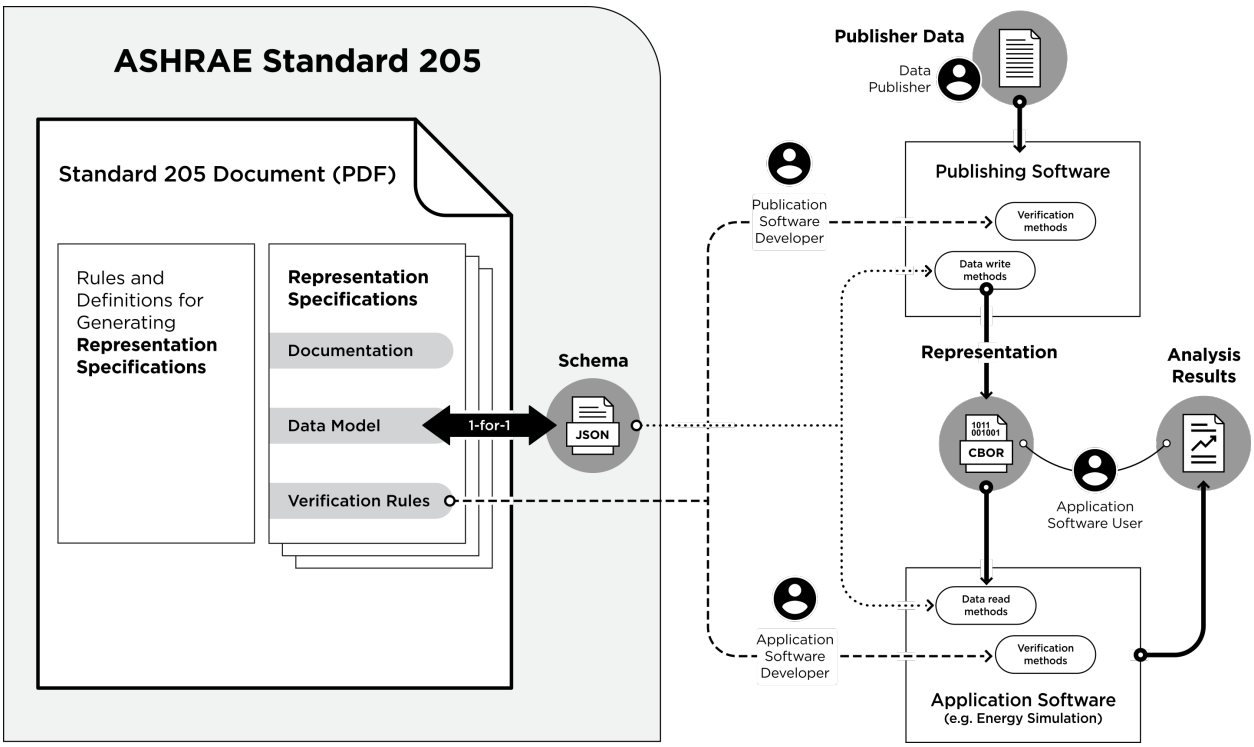


Figure 1 Standard 205 structure and application.

Standard 205 follows use of ASHRAE's SI units practice within representations, an exception to normal ASHRAE dual-units policy. In the context of automated data exchange, requiring or allowing more than one units convention would introduce ambiguity and complicate implementation. Unit conversion can be done as needed for application or display.

Given that all representations have common structures and elements, many software components can be shared by data publishers and application software developers. To this end, an open source project is underway. See https://github.com/open205.

This first version of Standard 205 is the starting point of an ongoing effort to develop efficient and accurate methods for conveying equipment performance data in an industry consensus form. Applying Standard 205 may require substantial investment by both data publishers (manufacturers) and application software developers. Their experiences in applying the standard will inform its future direction.

Standard Project Committee (SPC) 205 will be reconstituted as a Standing Standard Project Committee (SSPC) and anticipates creating addenda, including those that:

- *Include new representation specifications for additional equipment types.*
- *Modify existing representation specifications to make representations more accurate and practical to publish.*

The SSPC encourages input from all stakeholders.

1 PURPOSE

To facilitate automated sharing of equipment performance characteristics by defining data models and data serialization formats.

2 SCOPE

This standard applies to performance data for any HVAC&R or other facility system, equipment, or component.