



**BSR/ASHRAE/IBPSA Addendum *i* to
ANSI/ASHRAE Standard 205-2023**

Public Review Draft

Proposed Addendum *i* to Standard 205-2023, Representation of Performance Data for HVAC&R and Other Facility Equipment

**First Public Review (October 2026)
(Draft shows Proposed Changes to Current Standard)**

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Proposed BSR/ASHRAE/IBPSA Addendum *i* to ANSI/ASHRAE Standard 205-2023, *Representation of Performance Data for HVAC&R and Other Facility Equipment*

(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 to Addendum *i*

To address concerns related to data security in Standard 205, this addendum adds a new informative appendix, Methods for Data Security, describing several options that data publishers could use to control access to data. This appendix is intended to provide a resource for data publishers on how to adopt the use of Standard 205 within their organizations.

Within the standard, references to the new appendix are in an informative note in Section 5 and additional text in an informative note in Section 10.3. Note that these section numbers are as defined in Standard 205-2023 with addenda a – h applied.

[Note to Reviewers: This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and strikethrough (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Only these changes to the current standard are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed changes.]

Addendum *i* to Standard 205-2023

4 REPRESENTATION CONTENT

The representation shall be a file conforming to the CBOR data serialization format that (1) is valid according to the ASHRAE 205 JSON schema and (2) passes all verification rules specified in the representation specification.

Representation files shall be named xxxx.a205.cbor, where xxxx is a suitable identifier chosen by the data publisher for the equipment whose performance is represented in the file.

To be valid against the ASHRAE 205 JSON schema, the representation shall be correctly formatted and pass all constraint checks.

[Informative note: See Informative Appendix B Applications for Data Security for various scenarios and solutions data publishers may choose to use.](#)

10 DATA QUALITY, INTEGRITY, ACCESS, AND ACCURACY

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10.3 Data Access

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Informative note: Data publishers may restrict access to representations using user-specific licensing. Licensing mechanisms are not within the scope of Standard 205. Data publishers may provide public access or grant other entities permission to provide public access to their representations. [See Informative Appendix B Methods for Data Security for additional guidance.](#)

[Note to Reviewers: The following new informative text is not shown in underline and strikethrough form.]

INFORMATIVE APPENDIX B: METHODS FOR DATA SECURITY

B1. Introduction

Data publishers may have a variety of reasons for providing Standard 205-compliant representations of their equipment performance for use in application software such as energy simulation programs. One common reason is to provide sales support for the equipment that is being represented by providing building energy modelers enough information to accurately compare the equipment with alternatives using simulation software for specific building projects. The estimated energy use for the specific building project, with the equipment representation along with estimated first costs, provides building owners and architects with the information they need to make informed decisions about which equipment to select. Without detailed performance data, inaccurate estimates can result, and ultimately, recommendations for sub-optimal equipment may be made.

HVAC equipment manufacturers have historically provided data tables or graphs representing their equipment to modelers for use in building energy simulation. The formats for this data varied, but it was often in the form of a printed table and was usually provided by the manufacturer's sales engineers and needed to be interpreted by the building energy modeler into a format suitable for their software. The format of the data varied by manufacturer and sometimes even by different equipment lines within a manufacturer. The conversion process that the building energy modeler used was often fraught with problems since parameters were often mapped differently in the

modeling software compared to the way they were represented by the manufacturer. This data historically was provided during the sales process, usually with no formal licensing or contracting requirements placed on the use and dissemination of the data. The modeler typically would not share the converted information with other energy modelers who compete with them on future jobs. The spreadsheets or scripts used to convert the data into the format used by the simulation program are seen as proprietary tools used to bid on future jobs more competitively, and so they were not shared.

The paradigm changes with Standard 205 representations for equipment performance since that is a digital format that may be directly used by simulation software (although the process of implementation in simulation software is just beginning). While this unifies the format for equipment representations, since it is also directly usable by the software, it also removes the barrier that modelers had for sharing the information with other modelers, since no effort is made by the modeler to use it. In addition, the data provided in a Standard 205 representation may be much more detailed than historically provided. While this additional detail may more accurately portray the equipment operation because of the standardization of format, it can be used to both understand the highest efficiency operating points as well as the lowest efficiency. The portrayal of the full spectrum of equipment performance may result in astute sales engineers from one manufacturer being able to take advantage of understanding when equipment from competing manufacturers operates most poorly. Essentially, if all manufacturers provided their equipment data to modelers, it would result in an elevated importance of the performance evaluation process of the equipment itself, and indirectly, reduce the traditional value of the relationship and reputation built by the sales force of specific manufacturers.

Several technical and legal approaches can be employed by equipment manufacturers when providing Standard 205 representations for their equipment to mitigate these concerns. Choosing an approach or a combination of approaches is ultimately a business decision by the manufacturer providing the data.

B2. Resources

Since many of the resources related to this topic are common for software development and deployment, we would encourage the reader to use search engines to find updated information on the following topics:

- software licensing
- open-source licenses
- non-disclosure agreements
- cryptographic hash algorithms
- secure hash algorithm (SHA)

- public-key cryptography
- digital signatures
- digital watermark

B3. Scenarios

The following describes several scenarios and possible solutions for each. The manufacturers', modelers', and software vendors' perspectives are described in each scenario. The following table summarizes some of the key points of the scenarios and solutions.

Table 1 - Summary of Scenarios and Solutions

Scenario	Name	Possible Solutions
1	Prototypical Equipment with No Restrictions on Distribution	Copyright notice Permissive license
2	Wide Distribution is Good for Sales	Commercial license Cryptographic hash value
3	Balance of IP and Sales Goals	End-use licensing agreement Digital watermarking
4	IP More Important than Sales	Non-disclosure agreements Digitally signed and encrypted
5	IP must be protected at all costs	Simulation software in the cloud

B3.1 Scenario 1 – Prototypical Equipment with No Restrictions on Distribution

Description

These may be Standard 205 representations of equipment produced by national laboratories, state or local governments, or non-governmental organizations. The representations in this scenario are unlikely to be for actual equipment and instead may be for idealized equipment. This data may be

provided to fill in gaps due to manufacturers not providing data or simply default "baseline" equipment performance as part of standards. The representations may include historical, current typical, current high-efficiency, or even future equipment performance, trying to represent portions or entire markets of equipment.

Possible Solutions

Since no restrictions on distribution are needed, the solutions for this scenario may be as simple as including the copyright of the originator of the representation. An open source or other permissive license may be used or referenced. To ensure that the file has not been altered by an intermediary, the originator may want to post the files on a website along with a cryptographic hash value, such as SHA, that can be used by the modeler to verify that they are unaltered.

Manufacturers' Perspective

While this scenario is probably one that manufacturers do not implement, they are probably against having their equipment, which has real-world performance, being compared against idealized or prototypical equipment. Providing their own representations of actual equipment performance may reduce the need for prototypical performance.

Modelers' Perspective

While modelers welcome easy-to-access models without restrictions, they also would probably prefer to be modeling real equipment since their customers probably would prefer to understand how various real options perform. Absent actual equipment representations, modelers may feel that the best options available are prototypical. Modelers who now use default performance curves will probably see prototypical equipment representations as an improvement and embrace their use even when trying to model actual equipment.

Software Vendors' Perspective

Software vendors would prefer it if all representations were provided with no restrictions since no further concerns beyond the technical implementation for the simulation are necessary. The software vendors would concur with the modelers' perspective that real equipment representations are superior. Software vendors often provide libraries to aid users and would probably extensively use any data available with no restrictions.

B3.2 Scenario 2 - Wide Distribution is Good for Sales

Description

Some manufacturers may prefer to provide easy access to the Standard 205 representations of some or all their equipment to encourage evaluation and sales. This approach may provide a

strategic advantage by lowering the barrier faced by modelers trying to model actual equipment. This scenario may also fit a manufacturer that is a smaller player in a market with larger competitors, or one that provides only high-efficiency equipment, or when most other competitors are also sharing representations widely. The equipment representations are for actual equipment.

Possible Solutions

The main concern for manufacturers in this scenario is that the modeler is using the correct unaltered representation for their equipment. The manufacturer should include their copyright and a license that is not restrictive for the distribution of the representation file. To ensure that files are not altered, they may want to post the files on their website along with a cryptographic hash value, such as SHA, that can be used by the modeler to verify that they are unaltered.

Manufacturers' Perspective

In this scenario, manufacturers would probably expect that their competitors would be aware of the detailed equipment performance and have probably examined the files from both a sales and fundamental technology perspective. Divulging this detail either does not matter to the manufacturer, or they have already accepted that the possible gains outweigh any disadvantages. Manufacturers may work with software vendors to get reports about when software users run simulations with their specific representations. Some desktop and cloud-based software has some level of reporting data back to the software vendor about the use of their products, and manufacturers would likely be interested in understanding when and how often different representations are used for marketing purposes.

Modelers' Perspective

Modelers probably prefer this scenario most because they can use the representations provided by manufacturers for actual equipment. They can easily inspect that data to understand the performance data and optimize their simulations around the most efficient operating points. Modelers do not need to be concerned about accidentally violating a complex license and can provide the representations to their clients as part of deliverables. Some modelers would be concerned with even anonymous aggregated information being provided from the software to the vendor as a breach of confidentiality to their clients.

Software Vendors' Perspective

To verify that a file has not been altered, a cryptographic hash value such as SHA could be used. While originally confirmed manually by users, since this would be a tedious step, software developers would probably take over the role of confirming that a file had not been altered. This effort, while not significant, is unnecessary for the core mission of the software from the software vendors' perspective. Software vendors could support reporting anonymous aggregated data usage

of specific representation files if they already have a reporting infrastructure for their software. This could represent an additional income stream.

B3.3 Scenario 3 - Balance of IP and Sales Goals

Description

Manufacturers want to provide Standard 205 equipment representations directly to modelers, but do not want them shared further, especially with competitors. Manufacturers still want modelers to have access to their data to evaluate their equipment and provide simulation software-based recommendations to the building design team to specify it. To encourage use, they would like modelers to use any simulation software that supports Standard 205 representations. This maintains the traditional channel of the manufacturer's sales engineer providing equipment representations to building project team members, including the modeler. This scenario may be the most common, and some subtle distinctions may be worth exploring.

Possible Solutions

Both legal and technical solutions can be used in this scenario. The legal solutions include licensing agreements, either with typical end-use licensing agreements triggered by the use of the data or a license requiring review and acknowledgment before providing the Standard 205 representation file. The signing of the license agreement may be made by the modeler or the owner of the company for whom the modeler works. Technical solutions may include a digital watermark being added to each file, uniquely identifying who it was provided to. Since each user of a file has a unique file, it allows tracking the source of leaked file. Since the file is identifiable, a leaked file would bring liability to the modeler's company. Digital watermarks may be hidden in an excessive number of significant digits for numbers represented in text files or as a separate watermark string field in a digital CBOR file. An indicator that the file has digital watermark and who it was originally provided to should be displayed to the user by the software so they understand that others will see it if distributed.

Manufacturers' Perspective

In this scenario, manufacturers have a means to reduce but not eliminate the likelihood of their data being used by competitors. Most sales engineers for competitors understand that trying to get copies of equipment representations to examine the data is violating agreements, is not ethical, and will refrain from that path. Licensing is still provided to discourage even less ethical competitors from attempting to gain access to data that they should not have. From the perspective of intellectual property, for mass-produced equipment, it is likely that interested competitors have already acquired and learned from the products themselves. For semi-custom equipment, that is less likely, so the value of understanding detailed performance is higher. While

not a perfect solution, within the boundaries of normal business concerns, these solutions may be quite adequate.

Modelers' Perspective

Modelers always want the most accurate data possible for the equipment to be simulated and will agree to licenses in order to get accurate data. Complex licenses are seldom read, and the more stringent the license, the more complicated it will be. Some modelers who favor open-source tools may choose to use a default curve or other publicly available typical equipment performance rather than agreeing to what they see as an onerous license. The use of digital watermarking of files would have no impact on the modeler or the results of the model since the watermark may appear in significant digits that are not even used by the software.

Software Vendors' Perspective

The use of licensing between the modeler and the manufacturer has little impact on the software vendors. More care may be appropriate to ensure that software bugs related to the use of equipment representations are minimized. The use of an excessive number of digits for watermarking has no impact on the software vendor since the internal representation of the number is truncated automatically. Displaying who the file was originally provided to as indicated in the digital watermark would take some effort by the software vendor.

B3.4 Scenario 4 – IP More Important than Sales

Description

Manufacturers want to provide Standard 205 equipment representations directly to modelers, but do not want them shared further, especially with competitors. Manufacturers have agreements with selected software vendors and restrict modelers to using only that software when using the manufacturer's equipment representations. The traditional channel of the manufacturer's sales engineer is augmented with legal safeguards prior to providing equipment representations to building project team members.

Possible Solutions

Like Scenario 3, both legal and technical solutions can be used in this scenario. The legal solutions include even more restrictive licensing agreements, such as non-disclosure agreements before providing the Standard 205 representation file requiring physical or electronic signing, other contracts between the manufacturer and the organization performing the modeling, or even posting a bond in exchange for use of the representation. Advice on specific legal options is outside the scope of this document, but many exist, having a range of effectiveness, complexity, and nuisance. A technical solution is likely to involve encrypting the representation using public-key

cryptography and providing digital signatures (see Section 9.3). The manufacturers would provide the decryption keys to the software vendors. While encryption will prevent casual inspection by most people, it is not foolproof. Since encrypted representation files could be used in a variety of software programs installed on anyone's computer, those programs will at some point need to use the decrypted "plaintext" values, so a determined hacker can intercept the original data. While not technically perfect, encryption will probably prevent a very large fraction of modelers from gaining access to the original data. The output of a simulation program does provide another vector that may reveal to the modeler some or all of the detailed performance data. By looking at the timestep values of outputs, including energy consumption, the load, and the operating temperatures, the individual data points may be reverse-engineered. To prevent this, the manufacturer would need to have agreements with the software vendors not to reveal this level of detail to the users of the software for specific outputs. Manufacturers could also work with software vendors to display extra warnings to the modeler to reinforce license restrictions. Solutions, including a combination of both technical and legal, may be the most effective.

Manufacturers' Perspective

In this scenario, manufacturers have a means to further reduce but not eliminate the likelihood of their data being used by competitors. Encryption discourages even less ethical competitors from attempting to gain access to data that they should not have. Hacking of encrypted files is unlikely to be used by competing company sales engineers. The use of encryption and more restrictive licensing is not a perfect solution but will eliminate most vectors of concern. The use of encrypted downloadable music, videos, and books shows that this strategy works, although the popularity of streaming music and videos shows that this level of control is favored by many companies. Third-party cracking software exists for decrypting popular encrypted media formats but is unlikely to be developed in the niche of HVAC equipment representations.

Modelers' Perspective

Modelers always want the most accurate data possible for the equipment being simulated and will agree to go through some licensing hoops and use an encrypted file if necessary, but they will not fully trust a file describing performance that they cannot inspect and verify for themselves. While not trying to reverse engineer the data, they are likely to simulate different energy efficiency measures with building energy simulation software to ascertain the best performance options. Complex licenses are seldom read, and the more stringent the license, the more complicated it will be. Some modelers who favor open-source tools may choose to use a default curve or other publicly available typical equipment performance rather than agreeing to what they see as an onerous license. While most modelers will accept licensing terms and use encrypted files, some portion of the modelers may not, which may result in a smaller sales impact than other scenarios.

Software Vendors' Perspective

Software vendors probably prefer no encryption to be used since any level of encryption may trigger additional export controls on their software. In addition, encryption requires additional security measures to be made to the software to minimize the possibility of hacking and to reduce the possibility of coding errors exposing sensitive data. Some additional liability exists for software vendors when users select an encrypted file that is provided by a manufacturer since the modeler, and thus the building design team, has no way of seeing if the data represents the equipment.

B3.5 Scenario 5 - IP must be protected at all costs

Description

In this scenario, any leak of intellectual property could undermine the business of the manufacturer, and data on the performance of equipment can be used by competitors to understand or to reverse engineer the intellectual property. Due to this, providing Standard 205 representations outside their company would not be acceptable. For many businesses, this would seem to be the default scenario, but thoughtful analysis may reveal that less restrictive scenarios are acceptable.

Possible Solutions

Building energy simulations, including detailed equipment performance representations, are performed in the cloud. This approach can be used in conjunction with desktop software, but is just as likely to be used with a web-based interface that is fully hosted in the cloud. Some, but not all, building energy simulation software is available on these platforms. Complicating matters, several vendors of simulation software are also manufacturers of competing equipment, so supplying 205 representations to them would be infeasible. This further limits the number of software programs available to simulate the equipment with the 205 representations. Fortunately, a new software ecosystem where third parties can run the software would be possible, and not all simulation software is related to competing manufacturers. Since the detailed equipment performance representation is only shared with a handful of simulation program vendors, the necessity of it being in the 205 representation format is decreased. Instead, manufacturers may find it easier to simply support the native description for their equipment used by each software program. This approach decreases the value of 205 standardization if all manufacturers adopt it.

Manufacturers' Perspective

Manufacturers in this scenario can either directly provide cloud-based simulation or work with a small set of simulation software vendors to provide the same. This approach allows modelers to accurately simulate their equipment for specific building projects without much concern that intellectual property is at risk. By moving the simulation to the cloud, the vectors to access the data or reverse engineer it is eliminated. This approach does limit the number of modelers since not all

simulation software would be supported, which may reduce the overall value of this approach significantly.

Modelers' Perspective

Modelers seldom change building energy simulation software. They need to be experts at building energy simulation, and so the effort to change software tools and regain that expertise is significant. Those modelers who already use cloud-based simulation software that would now include accessing the detailed performance data for the manufacturer's equipment will continue to use it. Modelers are unlikely to use cloud-based software intended for the sole purpose of modeling equipment from a manufacturer, preferring instead general simulation software that can model efficiency measures for all aspects of the building. The reliability of cloud-based software solutions has grown to the point that most people do not consider it an issue except on the rare day that their internet goes down. Modelers will have little chance of gaining a deep understanding of the performance of the equipment, and some may choose not to use the manufacturer's representation for that reason alone. Overall, by restricting modelers to only some software, fewer will evaluate the manufacturer's equipment using detailed representations.

Software Vendors' Perspective

For desktop-based software that already uses a cloud infrastructure to perform simulations, or completely cloud-based software solutions, the use of 205 files provided by the manufacturer would be a relatively easy thing to implement. Of course, for software vendors that are also equipment manufacturers, it is unlikely that competing equipment manufacturers will provide their equipment representations. For third party software vendors, negotiating with equipment manufacturers to provide equipment representations may provide an additional income stream. Restricting information to be provided to the user to prevent reverse engineering the equipment performance can be done but adds complexity to their software.