ADDENDA

ANSI/ASHRAE Addendum bw to
ANSI/ASHRAE Standard 135-2016

A Data Communication Protocol for Building Automation and Control Networks

Approved by ASHRAE and by the American National Standards Institute on August 26, 2019.

This addendum was approved by a Standing Standard Project Committee (SSPC) 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 standard. Instructions for how to submit a change can be found on the ASHRAE® website (https://www.ashrae.org/continuous-maintenance).

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SPECIAL NOTE

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ASHRAE obtains consensus through participation of its national and international members, associated societies, and public review.

ASHRAE Standards are prepared by a Project Committee appointed specifically for the purpose of writing the Standard. 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 Standard. Every effort is made to balance the concerned interests on all Project Committees.

The Senior Manager of Standards of ASHRAE should be contacted for

a. interpretation of the contents of this Standard,
b. participation in the next review of the Standard,
c. offering constructive criticism for improving the Standard, or
d. permission to reprint portions of the Standard.

[This foreword and the "rationales" on the following pages are not part of this standard. They are merely informative and do not contain requirements necessary for conformance to the standard.]

FOREWORD

The purpose of this addendum is to present a proposed change for public review. These modifications are the result of change proposals made pursuant to the ASHRAE continuous maintenance procedures and of deliberations within Standing Standard Project Committee 135. The proposed changes are summarized below.

135-2016*bw*-1. Add Time Series Data Exchange File Format, p. 3

In the following document, language to be added to existing clauses of ANSI/ASHRAE 135-2016 and Addenda is indicated through the use of *italics*, while deletions are indicated by ~~strikethrough~~. Where entirely new subclauses are proposed to be added, plain type is used throughout. Only this new and deleted text is open to comment at this time. All other material in this document is provided for context only and is not open for public review comment except as it relates to the proposed changes.

The use of placeholders like X, Y, Z, X1, X2, N, NN, x, n, ?, etc., should not be interpreted as literal values of the final published version. These placeholders will be assigned actual numbers/letters only after final publication approval of the addendum.

135-2016*bw*-1. Add Time Series Data Exchange File Format

Rationale

There is a need for a simple, universal data exchange file format for the transfer of a time-series data between various platforms for operations such as analyzing the energy performance of buildings.

[Change **Clause 3.3,** p.7]

3.3 Abbreviations and Acronyms Used in this Standard

. . .

CRC	cyclic redundancy check
CSV	*comma-separated values, as defined by RFC 4180*
D' '	denotes that decimal notation is used between the single quotes

. . .

[Insert new entry to **Clause 25**, preserving the alphabetical order, p. 932]

IETF RFC 4180, Common Format and MIME Type for Comma-Separated Values (CSV) Files, Internet Engineering Task Force

[Add new **Annex XX**, p. 1348]

ANNEX XX – TIME SERIES DATA EXCHANGE FILE FORMAT (NORMATIVE)

(This annex is part of this standard and is required for its use.)

Collected trend data has value in many third-party applications, including building energy optimization using energy information systems, trend analysis for one-time building assessments, continuous commissioning, and fault detection and diagnostics. To facilitate standard exchange of this data, its format in text files is defined here.

This format is designed for export from databases in servers or workstation-class computers with user interfaces. It is not intended to replace the BACnet ReadRange service in devices or the queryable history services provided by BACnet Web Services.

This file format defines a series of records, each with a single time stamp associated with value(s) for one or more sources selected by the user. The number of sources present in a single file is a local matter and is limited only by the capabilities of the generating software and the intended consuming software.

XX.1 File Format

Trend data shall be exported as UTF-8 text files in CSV format as specified by RFC 4180, with columns comprised of a timestamp and associated data values. Note that RFC 4180 specifies the rules for quoting when fields contain commas or quotes and the requirements for line terminations.

The header line shall be present to describe the data in each column. Subsequent rows shall contain the time stamp in column one and the associated data values in other columns. Rows shall be in ascending order of date and time.

The column name for column one shall be "DateTime". The names for the other columns shall be nonempty printable strings, each limited to 80 characters.

The timestamp column shall use the format defined by XML Schema xs:dateTime, Fractional seconds are optional. However, the time zone indicator is required.

XX.2 Representation of Data

Each data value shall be represented as a string that is appropriate for the data type, and shall be formatted as if returned in 'plain text' from the services described in Clause W.9, plus the requirements for quoting specified by RFC 4180. Only primitive data types can be represented. The following table summarizes the requirements made by Clause W.9, which in turn references clauses in Annex Q and Annex Y.

Source Data Type	Serialization Type	Examples	Notes
BitString	xs:string	fault fault;overridden <empty string>	A semicolon separated list of the names of the bits that are true. i.e., an empty string means that all bits are false. See Clause Y.12.11
Boolean	xs:boolean	true false	
Date	xs:date	2018-01-24	
Date with unspecified value	xs:string	----/--/--	See Clause W.9
DatePattern	xs:string	*-01-24 2018-01-* *-*-*	See Clause Y.12.14
DateTime	xs:dateTime	2018-01-24T08:56:00+01:00 2018-01-24T07:56:00.00Z	Time zone indicator is required for CSV files
DateTime with unspecified value	xs:string	----/--/--T--:--:--Z	See Clause W.9
DateTimePattern	xs:string	2018-01-24 10:*:*.* *-*-* 3 10:00:00.00 *-*-* *:*:*.*	See ClauseY.12.16
Double	xs:double	123456789.00	
Enumerated	xs:string	high idle	See Clause Y.12.12
Integer	xs:integer	1234	
Link	xs:string	http://example.com/abc	
ObjectIdentifier	xs:string	calendar,12	See Clause Y.20.1
ObjectIdentifierPattern	xs:string	calendar,*	See Clause Y.20.2
OctetString	xs:hexBinary	0103CAFEBABE99 0103cafebabe99	
Raw	xs:hexBinary	0103CAFEBABE99 0103cafebabe99	
Real	xs:float	1234.56	
String	xs:string	hello world "hello, world"	Embedded commas need to be quoted in CSV
StringSet	xs:string	foo;bar;baz	See Clause Y.12.10.
Time	xs:time	12:05:22 12:05:22.55	Fractional seconds is optional
Time with unspecified value	xs:string	--:--:--	See Clause W.9
TimePattern	xs:string	10:24:*.* *:*:*.*	See Clause Y.12.18
Unsigned	xs:nonNegativeInteger	1234	
WeekNDay	xs:string	"1,1,*"	See Clause Y.20.3

Missing data shall be represented by a string consisting of a question mark followed by a space followed by a decimal error number defined by Table W-14. See Clause W.40.

XX.3 File Generation

As an example implementation, a system for collecting or archiving trends could provide a menu in the user interface of the system that allows the export of trend data in a standardized format. The export function would incorporate options to limit the data exported to certain time periods and/or to certain trend sources. The means of specifying what to export is a local matter.

A properly formatted value shall be present for each source for each time stamp. If a value for a source is not available for a particular timestamp, an error string, as specified in Clause XX.2, shall be present in that column. It is a local matter what "available" means. As an example implementation, the generating software could have user selectable options for whether to interpolate or otherwise generate an appropriate value for a given time stamp.

The names of the columns shall be under user control within the limitations specified by Clause XX.1. The generating software shall, by default, enforce that the column names are unique within the file, unless explicitly overridden by the user.

The name of the exported file is a local matter with the exception that either the user shall be given the opportunity to name the file or the name of trend source shall be incorporated into the file name so as to make it recognizable to the user and unique among other exported files.

XX.4 Example Files

Example of a simple single-value CSV file:

```
DateTime,B8-Plant-CH3-CHWS-Temp-F
2019-06-16T13:01:02-08:00,42.0
2019-06-16T13:06:02-08:00,42.5
2019-06-16T13:11:02-08:00,42.3
```

Example of a CSV file with multiple values and empty bitstrings:

```
DateTime,B8-Plant-CH3-CHWS-Temp-F,Status_Flags,Running
2019-06-16T21:01:02Z,42.0,,active
2019-06-16T21:06:02Z,0.0,fault;alarm,active
2019-06-16T21:11:02Z,42.3,,active
```

Example of a CSV file with a missing value:

```
DateTime,SomeData1,SomeData2
2019-06-16T21:01:02Z,74.0,75.5
2019-06-16T21:06:02Z,? 24,75.7
2019-06-16T21:11:02Z,74.2,75.3
```

[Add a new entry to **History of Revisions**, p. 1364]

HISTORY OF REVISIONS

...	...	...
1	21	**Addendum *bw* to ANSI/ASHRAE Standard 135-2016** Approved by ASHRAE and by the American National Standards Institute on August 26, 2019. 1. Add Time Series Data Exchange File Format

POLICY STATEMENT DEFINING ASHRAE'S CONCERN FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES

ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted Standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the Standards and Guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive Technical Committee structure, continue to generate up-to-date Standards and Guidelines where appropriate and adopt, recommend, and promote those new and revised Standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date Standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating Standards and Guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.

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9/19