



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

Public Review Draft

**Proposed Addendum *bw* to Standard
135-2016, BACnet[®] - A Data
Communication Protocol for Building
Automation and Control Networks**

**Second Public Review (March 2019)
(Draft shows Proposed Changes to Current Standard)**

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[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 ~~strike through~~. 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	<i>comma-separated values, as defined by RFC 4180</i>
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 Clause Y.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	X	Addendum <i>bw</i> to ANSI/ASHRAE Standard 135-2016 Approved by ASHRAE on MONTH DAY, 20XX ; and by the American National Standards Institute on MONTH DAY, 20XX . 1. Add Time Series Data Exchange File Format