

BSR/ASHRAE Addendum *k*  
to ANSI/ASHRAE Standard 135-2008

# Public Review Draft

ASHRAE® Standard

## Proposed Addendum *k* to Standard 135-2008, *BACnet*®—*A* *Data Communication Protocol* *for Building Automation and* *Control Networks*

Second Public Review (**March 2009**)  
(Draft Shows Proposed Changes  
to Current Standard)

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**[This foreword and the “rationale” on the following page 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.

**135-2008k-1. Add support for UTF-8, p. 1.**

**135-2008k-2. Change JIS Reference, p. 6.**

In the following document, language to be added to existing clauses of ANSI/ASHRAE 135-2008 and Addenda is indicated through the use of *italics*, while deletions are indicated by ~~striketrough~~. Where entirely new subclauses are proposed to be added, plain type is used throughout. Only this new and deleted text is open to comment as this time. All other material in this addendum is provided for context only and is not open for public review comment except as it relates to the proposed changes.

**135-2008k-1. Add support for UTF-8.**

**Rationale**

Due to the historic use of ANSI X3.4 in many controllers, there is an expectation that for many years to come BACnet installations will have to be able to deal with multiple character sets (ANSI X3.4 and UTF-8). This change is intended to extend character set 0 to include all UTF-8 characters.

It is expected to be fully backward compatible with devices that use character set 0 within the ANSI X3.4 subset of UTF-8. It is also expected that most devices that do not display characters will be compatible over the full range of UTF-8, thus enabling the use of internationalized strings in the extensive base of currently installed products.

This change does not address the issue surrounding display devices that are not capable of rendering the complete set of UTF-8 glyphs, as is already the case with devices that support the DBCS, UCS-2, and UCS-4 character sets.

**Addendum 135-2008k-1**

[Change Clause 3.2.42, p. 4]

**3.2.42 printable character:** a character that represents a printable symbol as opposed to a device control character. Printable characters These include, but are not limited to, upper- and lowercase letters, punctuation marks, and mathematical symbols. The exact set depends upon the character set being used. ~~In ANSI X3.4 the printable characters are represented by single octets in the range X'20'—X'7E'.~~

[Change Clause 20.2.9, p. 420 ]

**20.2.9 Encoding of a Character String Value**

The encoding of a character string value shall be primitive.

The encoding shall contain an initial contents octet, and zero, one, or more additional contents octets equal in value to the octets in the data value, in the order in which they appear in the data value, i.e., most significant octet first, and with the most significant bit of an octet of the data value aligned with the most significant bit of an octet of the contents octets.

The initial octet shall specify the character set with the following encoding:

- X'00' ANSI X3.4/ISO 10646 (UTF-8)
- X'01' IBM™/Microsoft™ DBCS
- X'02' JIS C 6226
- X'03' ISO 10646 (UCS-4)
- X'04' ISO 10646 (UCS-2)
- X'05' ISO 8859-1

Other values of the initial octet are reserved by ASHRAE.

Example: Application-tagged character string

```

ASN.1 = CharacterString
Value = "This is a BACnet string!" (ANSI X3.4 ISO 10646 UTF-8)
Application Tag = Character String (Tag Number = 7)
Encoded Tag = X'75'
Length Extension = X'19'
Character Set = X'00' (ANSI X3.4 ISO 10646: UTF-8)
Encoded Data = X'546869732069732061204241
                436E657420737472696E6721'

```

[Change clause **20.2.15** p. 423]

Example: Context-tagged character string

ASN.1 =	[5] CharacterString
Value =	"This is a BACnet string!" ( <del>ANSI X3.4</del> ISO 10646 UTF-8)
Context Tag =	5
Encoded Tag =	X'5D'
Length Extension =	X'19'
Character Set =	X'00' ( <del>ANSI X3.4</del> ISO 10646: UTF-8)
Encoded Data =	X'546869732069732061204241 436E657420737472696E6721'

[Change Clause **Annex A** p. 494]

**Character Sets Supported:**

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- |   |   |                                     |
|---|---|-------------------------------------|
| <input type="checkbox"/> <del>ANSI X3.4</del> ISO 10646 (UTF-8) | <input type="checkbox"/> IBM™/Microsoft™ DBCS | <input type="checkbox"/> ISO 8859-1 |
| <input type="checkbox"/> ISO 10646 (UCS-2)                      | <input type="checkbox"/> ISO 10646 (UCS-4)    | <input type="checkbox"/> JIS C 6226 |

[Change Clause F.1.4 p. 556]

X'4C'	SD Context Tag 4 (Acknowledgment Source, L=4)
X'00'	<del>ANSI X3.4</del> ISO 10646 (UTF-8) Encoding
X'4D444C'	"MDL"

[Change Clause F.1.5 p. 556]

X'4C'	SD Context Tag 4 (Acknowledgment Source, L=4)
X'00'	<del>ANSI X3.4</del> ISO 10646 (UTF-8) Encoding
X'4D444C'	"MDL"

[Change Clause F.1.9 p. 562]

X'1C'	SD Context Tag 1 (Requesting Source, L=4)
X'00'	<del>ANSI X3.4</del> ISO 10646 (UTF-8) Encoding
X'4D444C'	"MDL"

[Change Clause F.3.3 p. 567]

X'75'	Application Tag 7 (Character String, L>4)
X'08'	Extended Length=8
X'00'	<del>ANSI X3.4</del> ISO 10646 (UTF-8) Encoding
X'5472656E642031'	"Trend 1"

[Change Clause F.3.6, p. 573]

X'75'	Application Tag 7 (Character String, L>4)
X'0C'	Extended Length=12
X'00'	<del>ANSI X3.4</del> ISO 10646 (UTF-8) Encoding
X'432A205072657373757265'	"C* Pressure"
X'3F'	PD Closing Tag 3 (Comparison Value)
X'09'	SD Context Tag 0 (Property Identifier, L=1)

	X'4D'	77 (OBJECT_NAME)
	X'29'	SD Context Tag 2 (Relation Specifier)
	X'00'	0 (EQUAL)
	X'3E'	PD Opening Tag 3 (Comparison Value)
	X'75'	Application Tag 7 (Character String, L>4)
	X'10'	Extended Length=16
	X'00'	<del>ANSI X3.4</del> ISO 10646 (UTF-8) Encoding
	X'41433F20537570706C792054656D70'	"AC? Supply Temp"
	X'3F'	PD Closing Tag 3 (Comparison Value)
	X'1F'	PD Closing Tag 1 (List Of Selection Criteria)
X'0F'		PD Closing Tag 0 (Object Selection Criteria)
X'1E'		PD Opening Tag 1 (List Of Property References)
	X'09'	SD Context Tag 0 (Property Identifier, L=1)
	X'4D'	77 (OBJECT_NAME)
X'1F'		PD Closing Tag 1 (List Of Property References)

Assuming this service procedure executes correctly, a complex acknowledgment is returned:

X'30'		PDU Type=3 (BACnet-ComplexACK-PDU, SEG=0, MOR=0)
X'54'		Invoke ID=84
X'0D'		Service Ack Choice=13 (ReadPropertyConditional-ACK)
X'0C'		SD Context Tag 0 (Object Identifier, L=4)
X'00000004'		Analog Input, Instance Number=4
X'1E'		PD Opening Tag 1 (List Of Results)
	X'29'	SD Context Tag 2 (Property Identifier, L=1)
	X'4D'	77 (OBJECT_NAME)
	X'4E'	PD Opening Tag 4 (Property Value)
	X'75'	Application Tag 7 (Character String, L>4)
	X'10'	Extended Length=16
	X'00'	<del>ANSI X3.4</del> ISO 10646 (UTF-8) Encoding
	X'41433120537570706C792054656D70'	"AC1 Supply Temp"
	X'4F'	PD Closing Tag 4 (Property Value)
X'1F'		PD Closing Tag 1 (List Of Results)
X'0C'		SD Context Tag 0 (Object Identifier, L=4)
X'00000007'		Analog Input, Instance Number=7
X'1E'		PD Opening Tag 1 (List Of Results)
	X'29'	SD Context Tag 2 (Property Identifier, L=1)
	X'4D'	77 (OBJECT_NAME)
	X'4E'	PD Opening Tag 4 (Property Value)
	X'75'	Application Tag 7 (Character String, L>4)
	X'0E'	Extended Length=14
	X'00'	<del>ANSI X3.4</del> ISO 10646 (UTF-8) Encoding
	X'43575031205072657373757265'	"CWP1 Pressure"
	X'4F'	PD Closing Tag 4 (Property Value)
X'1F'		PD Closing Tag 1 (List Of Results)
X'0C'		SD Context Tag 0 (Object Identifier, L=4)
X'00000008'		Analog Input, Instance Number=8
X'1E'		PD Opening Tag 1 (List Of Results)
	X'29'	SD Context Tag 2 (Property Identifier, L=1)
	X'4D'	77 (OBJECT_NAME)
	X'4E'	PD Opening Tag 4 (Property Value)
	X'75'	Application Tag 7 (Character String, L>4)

	X'19'	Extended Length=25
	X'00'	<del>ANSI X3.4</del> ISO 10646 (UTF-8) Encoding
		X'4368696C6C657220312046726566F6E205072657373757265' "Chiller 1 Freon Pressure"
	X'4F'	PD Closing Tag 4 (Property Value)
X'1F'		PD Closing Tag 1 (List Of Results)
X'0C'		SD Context Tag 0 (Object Identifier, L=4)
X'000000A'		Analog Input, Instance Number=10
X'1E'		PD Opening Tag 1 (List Of Results)
	X'29'	SD Context Tag 2 (Property Identifier, L=1)
	X'4D'	77 (OBJECT_NAME)
	X'4E'	PD Opening Tag 4 (Property Value)
	X'75'	Application Tag 7 (Character String, L>4)
	X'10'	Extended Length=16
	X'00'	<del>ANSI X3.4</del> ISO 10646 (UTF-8) Encoding
		X'41433220537570706C792054656D70' "AC2 Supply Temp"
	X'4F'	PD Closing Tag 4 (Property Value)
X'1F'		PD Closing Tag 1 (List Of Results)
X'0C'		SD Context Tag 0 (Object Identifier, L=4)
X'0000000C'		Analog Input, Instance Number=12
X'1E'		PD Opening Tag 1 (List Of Results)
	X'29'	SD Context Tag 2 (Property Identifier, L=1)
	X'4D'	77 (OBJECT_NAME)
	X'4E'	PD Opening Tag 4 (Property Value)
	X'75'	Application Tag 7 (Character String, L>4)
	X'10'	Extended Length=16
	X'00'	<del>ANSI X3.4</del> ISO 10646 (UTF-8) Encoding
		X'41433320537570706C792054656D70' "AC3 Supply Temp"
	X'4F'	PD Closing Tag 4 (Property Value)
X'1F'		PD Closing Tag 1 (List Of Results)

[Change Clause F.4.1 p. 579]

	X'08'	Extended Length=8
	X'00'	<del>ANSI X3.4</del> ISO 10646 (UTF-8) Encoding
		X'23656762646621' "#egbdf!"

[Change Clause F.4.4 p. 581 ]

	X'09'	Extended Length=9
	X'00'	<del>ANSI X3.4</del> ISO 10646 (UTF-8) Encoding
		X'4162436445664768' "AbCdEfGh"

[Change Clause F.4.5 p. 581]

	X'18'	Extended Length=24
	X'00'	<del>ANSI X3.4</del> ISO 10646 (UTF-8) Encoding
		X'504D20726571756972656420666F722050554D50333437' "PM required for PUMP347"

[Change Clause F.4.6 p. 581]

	X'18'	Extended Length=24
	X'00'	<del>ANSI X3.4</del> ISO 10646 (UTF-8) Encoding
		X'504D20726571756972656420666F722050554D50333437' "PM required for PUMP347"

[Change Clause F.4.8 p. 582]

X'07'	Extended Length=7
X'00'	<del>ANSI X3.4</del> ISO 10646 (UTF-8) Encoding
X'4F4154656D70'	"OATemp"

[Change Clause F.4.8 p. 582 (second occurrence)]

X'07'	Extended Length=7
X'00'	<del>ANSI X3.4</del> ISO 10646 (UTF-8) Encoding
X'4F4154656D70'	"OATemp"

[Change Clause F.4.8 p. 582 (third occurrence)]

X'07'	Extended Length=7
X'00'	<del>ANSI X3.4</del> ISO 10646 (UTF-8) Encoding
X'4F4154656D70'	"OATemp"

[Add the following new reference in Clause **25**, p. 491]  
[Note: the lines shown here are to be added with italics as shown.]

## **25 REFERENCES**

...  
UNICODE Technical Report# 17-5: *Character Encoding Model*. The Unicode Consortium.  
...

### **Sources for Reference Material**

...  
The Unicode Consortium. P.O. Box 391476, Mountain View, CA 94039-1476, USA.

**135-2008k-2. Update the JIS Reference.**

**Rationale**

The standard is updated to reflect the fact that the Japanese Industrial Standards Committee has changed the name of “JIS C 6226” to “JIS X 0208”.

**Addendum 135-2008k-2**

[Change Clause **20.2.9**, p. 381.]

**20.2.9 Encoding of a Character String Value**

The encoding of a character string value shall be primitive.

The encoding shall contain an initial contents octet, and zero, one, or more additional contents octets equal in value to the octets in the data value, in the order in which they appear in the data value, i.e., most significant octet first, and with the most significant bit of an octet of the data value aligned with the most significant bit of an octet of the contents octets.

The initial octet shall specify the character set with the following encoding:

- X'00' ANSI X3.4
- X'01' IBM™/Microsoft™ DBCS
- X'02' JIS ~~C 6226~~ X 0208
- X'03' ISO 10646 (UCS-4)
- X'04' ISO 10646 (UCS-2)
- X'05' ISO 8859-1

Other values of the initial octet are reserved by ASHRAE.

...

[Change clause Annex A p 471]

**Character Sets Supported:**

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- ANSI X3.4
- IBM™/Microsoft™ DBCS
- ISO 8859-1
- ISO 10646 (UCS-2)
- ISO 10646 (UCS-4)
- JIS ~~C 6226~~ X 0208