



ASHRAE ADDENDA

BACnet[®]—A Data Communication Protocol for Building Automation and Control Networks

Approved by the ASHRAE Standards Committee on January 29, 2011; by the ASHRAE Board of Directors on February 2, 2011; and by the American National Standards Institute on February 3, 2011.

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. The change submittal form, instructions, and deadlines may be obtained in electronic form from the ASHRAE Web site (www.ashrae.org) or in paper form from the Manager of Standards.

The latest edition of an ASHRAE Standard may be purchased on the ASHRAE Web site (www.ashrae.org) or from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail: orders@ashrae.org. Fax: 404-321-5478. Telephone: 404-636-8400 (worldwide), or toll free 1-800-527-4723 (for orders in US and Canada). For reprint permission, go to www.ashrae.org/permissions.

© 2011 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.



ISSN 1041-2336

**American Society of Heating, Refrigerating
and Air-Conditioning Engineers, Inc.**

1791 Tullie Circle NE, Atlanta, GA 30329
www.ashrae.org

ASHRAE Standing Standard Project Committee 135
Cognizant TC: TC 1.4, Control Theory and Application
SPLS Liaison: Richard L. Hall

David Robin, *Chair**
Carl Neilson, *Vice-Chair*
Bernhard Isler, *Secretary**
Donald P. Alexander*
Barry B. Bridges*
Clifford H. Copass
Coleman L. Brumley, Jr.*
Sharon E. Dinges*

Stephen Karg*
Simon Lemaire
J. Damian Ljungquist*
John J. Lynch
Bryan Meyers
Dana Petersen
Frank Schubert
Ted Sunderland

William O. Swan, III
David B. Thompson*
Stephen J. Treado*
Klaus Wagner
J. Michael Whitcomb*
Grant N. Wichenko*
Christoph Zeller
Scott Ziegenfus

*Denotes members of voting status when the document was approved for publication.

ASHRAE STANDARDS COMMITTEE 2010–2011

H. Michael Newman, *Chair*
Carol E. Marriott, *Vice-Chair*
Douglass S. Abramson
Karim Amrane
Robert G. Baker
Hoy R. Bohanon, Jr.
Steven F. Bruning
Kenneth W. Cooper
Martin Dieryckx

Allan B. Fraser
Krishnan Gowri
Maureen Grasso
Cecily M. Grzywacz
Richard L. Hall
Nadar R. Jayaraman
Byron W. Jones
Jay A. Kohler
Frank Myers

Janice C. Peterson
Douglas T. Reindl
Boggarm S. Setty
James R. Tauby
James K. Vallort
William F. Walter
Michael W. Woodford
Craig P. Wray
Hugh F. Crowther, *BOD ExO*
William P. Bahnfleth, *CO*

Stephanie Reiniche, *Manager of Standards*

SPECIAL NOTE

This American National Standard (ANS) is a national voluntary consensus standard developed under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). *Consensus* is defined by the American National Standards Institute (ANSI), of which ASHRAE is a member and which has approved this standard as an ANS, as “substantial agreement reached by directly and materially affected interest categories. This signifies the concurrence of more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that an effort be made toward their resolution.” Compliance with this standard is voluntary until and unless a legal jurisdiction makes compliance mandatory through legislation.

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 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.

DISCLAIMER

ASHRAE uses its best efforts to promulgate Standards and Guidelines for the benefit of the public in light of available information and accepted industry practices. However, ASHRAE does not guarantee, certify, or assure the safety or performance of any products, components, or systems tested, installed, or operated in accordance with ASHRAE's Standards or Guidelines or that any tests conducted under its Standards or Guidelines will be nonhazardous or free from risk.

ASHRAE INDUSTRIAL ADVERTISING POLICY ON STANDARDS

ASHRAE Standards and Guidelines are established to assist industry and the public by offering a uniform method of testing for rating purposes, by suggesting safe practices in designing and installing equipment, by providing proper definitions of this equipment, and by providing other information that may serve to guide the industry. The creation of ASHRAE Standards and Guidelines is determined by the need for them, and conformance to them is completely voluntary.

In referring to this Standard or Guideline and in marking of equipment and in advertising, no claim shall be made, either stated or implied, that the product has been approved by ASHRAE.

[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

Addendum 135ab to ANSI/ASHRAE Standard 135-2008 contains a number of changes to the current standard. 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 changes are summarized below.

135-2008ab-1 Add More Standard Baud Rates for MS/TP, p. 2.

In the following document, language added to existing clauses of ANSI/ASHRAE 135-2008 and addenda is indicated through the use of *italics*, while deletions are indicated by ~~strikethrough~~. Where entirely new subclauses are added, plain type is used throughout.

135-2008ab-1 Add More Standard Baud Rates for MS/TP

Rationale

As the speed of processors has increased over time, so should the standard speeds for MS/TP networks be increased.

[Change Clause 9.2.1, p. 74]

9.2.1 Medium

An MS/TP EIA-485 network shall use shielded, twisted-pair cable with characteristic impedance between 100 and 130 ohms. Distributed capacitance between conductors shall be less than 100 pF per meter (30 pF per foot). Distributed capacitance between conductors and shield shall be less than 200 pF per meter (60 pF per foot). Foil or braided shields are acceptable. The maximum recommended length of an MS/TP segment is ~~1200 meters (4000 feet)~~ with AWG 18 (0.82 mm² conductor area) cable is specified in Clause 9.2.3. The use of greater distances and/or different wire gauges shall comply with the electrical specifications of EIA-485.

[Change Clause 9.2.3, p. 75]

9.2.3 Timing

Octets shall be transmitted using non-return to zero (NRZ) encoding with one start bit, eight data bits, no parity, and one stop bit. The start bit shall have a value of zero, while the stop bit shall have a value of one. The data bits shall be transmitted with the least significant bit first. This is illustrated in Figure 9-2.

Although asynchronous framing is used, there shall be no more than T_{frame_gap} of idle line (logical ones or stop bits) between any two octets of a frame.

~~The standard baud rate shall be 9600, plus or minus 1%. Any or all of the additional baud rates 19200, 38400, and 76800 may be supported at the vendor's option, but the 9600 baud shall be selectable. The standard baud rates are shown in the table below. The required baud rates, plus or minus 1%, shall be supported. Any or all of the optional baud rates, plus or minus 1%, may be supported at the vendor's option.~~

Baud Rate	Requirement	Recommended Maximum Distance
9600	Required	1200 meters (4000 feet)
19200	Optional	1200 meters (4000 feet)
38400	Required	1200 meters (4000 feet)
57600	Optional	1200 meters (4000 feet)
76800	Optional	1200 meters (4000 feet)
115200	Optional	1000 meters (3280 feet)

Transmitter enable: A node shall enable its EIA-485 driver before it generates the leading edge of the first start bit of a frame. The node shall drive the line to the logical one state during the time between the enable and the leading edge of the first start bit of a frame.

Transmitter disable: A node shall not disable its EIA-485 driver until the stop bit of the final octet of a frame has been generated. The node shall disable its EIA-485 driver within $T_{postdrive}$ after the beginning of the stop bit of the final octet of a frame in order that it not interfere with any subsequent frame transmitted by another node. This specification allows, but does not encourage, the use of a "padding" octet after the final octet of a frame in order to facilitate the use of common UART transmit interrupts for driver disable control. If a "padding" octet is used, its value shall be X'FF'. The "padding" octet is not considered part of the frame, that is, it shall be included within $T_{postdrive}$.

Receive to Transmit turn-around: A node shall not enable its EIA-485 driver for at least $T_{turnaround}$ after the node receives the final stop bit of any octet.

[Add a new entry to **History of Revisions**, p. 688]

(This History of Revisions is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard.)

HISTORY OF REVISIONS

<i>Protocol</i>		<i>Summary of Changes to the Standard</i>
<i>Version</i>	<i>Revision</i>	
...
1	12	Addendum ab to ANSI/ASHRAE 135-2008 Approved by the ASHRAE Standards Committee January 29, 2011; by the ASHRAE Board of Directors February 2, 2011; and by the American National Standards Institute February 3, 2011. 1. Add More Standard Baud Rates for MS/TP.

**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.

