Agenda
Technical Committee on
Notification Appliances for Fire Alarm and Signaling Systems (SIG-NAS)
NFPA 72 (A2021) Second Draft Meeting

Virtual Meeting
June 8, 2020

Item 20-6-1 Call to Order

Item 20-6-2 Roll Call and Introductions

Item 20-6-3 Approval of Meeting Agenda

Item 20-6-4 Approval of Meeting Minutes

Item 20-6-5 Staff/Chair Remarks

Item 20-6-6 Task Group Reports

Item 20-6-7 Review of Chapter 11 and establish/revise necessary references in Chapter 18/Annex 18 to Chapter 11 as required

Item 20-6-8 Public Comments and Second Revisions

Item 20-6-9 Old/New Task Groups

Item 20-6-10 Old Business

Item 20-6-11 New Business

Item 20-6-12 Review Dates and Times for Future Meetings/Conference Calls

Item 20-6-13 Adjournment and Closing Remarks

Notification Appliances for Fire Alarm and Signaling Systems — SIG-NAS

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Notification Appliances for Fire Alarm and Signaling Systems

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Notification Appliances for Fire Alarm and Signaling Systems

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Minutes
Technical Committee on
Notification Appliances for Fire Alarm and Signaling Systems (SIG-NAS)
NFPA 72 First Draft Meeting (A2021 cycle)
Indianapolis, IN
July 22 - 23, 2019

Item 19-7-1. Call to Order

The meeting of the SIG-NAS committee was called to order by Technical Committee Chair David Lowrey promptly on July 22, 2019 at 8:01 AM EST, the meeting on July 22, 2019 was adjourned at 4:45 PM EST and reconvened on July 23, 2019 at 8:00 AM EST.

Item 19-7-2. Roll Call and Introductions

For a list of committee members, guests and NFPA Staff present see the attachment.

Item 19-7-3. Approval of Meeting Agenda

The meeting agenda was approved.

Item 19-7-4. Approval of Meeting Minutes

The July 17 - 18, 2017 minutes were approved.

Item 19-7-5. Staff/Chair Remarks

Opening and welcoming comments were made by David Lowrey. NFPA procedures were also reviewed. Opening comments were made by Laura Moreno (NFPA Staff) who also reviewed the process timeline and terminology used in the process. Review of allowable committee actions on Public Inputs, First Revisions and procedures were also reviewed. NFPA procedures were also reviewed.

Item 19-7-6. Task Group Reports

Morris Stoops updated the committee on activity related to the Notification Appliance Circuits and Terminology Task Group. The scope of this Task Group is to provide guidance on proper design, installation and testing of DC and AC Notification Appliance Circuits. The Notification Appliance Circuits and Terminology Task Group members are Chair Morris Stoops, Leon Newsome, Robert Schifiliti, James Mongeau, John Swanson, David Newhouse, Todd Alford, Daniel Grosch, Mark Hamilton, Jack Poole, Drew Poole, Lynn Nielson, Robert Accosta and Michael Edwards.

Also discussed was activity related to the Notification Amplitude Task Group. The scope of this Task Group is to provide guidance on system amplitude and related outputs so that in certain cases where acceptable to the AHJ, such as, but not limited to facilities with autistic people, outputs may be lower than the maximum permitted and above private mode signaling. The Notification Amplitude Task Group members include Chair Morris Stoops, Leon Newsome, David Newhouse, Bob Schifiliti, John Swanson, Jim Mongeau, Todd Alford, Daniel Grosch, Mark Hamilton, Paul Strelecki, Michael Edwards and Robert Accosta.

Item 19-7-7. Public Inputs and First Revisions

Committee deliberation and action on Public Inputs, First Revisions and Committee Inputs ensued.

The Sleeping Area Task Group was formed whose scope is to provide guidance and clarification related to the requirements of low frequency sounders and visual notification appliances for areas where sleeping may occur. Members include Chair Morris Stoops, Scott Panowitz, Drew Poole, David Dressler, Mark Hamilton, Steve Lewis, John Swanson and Dave Newhouse.

Item 19-7-8. Old Business

There was no old business.

Item 19-7-9. New Business

As mentioned under Item 19-7-7, a Task Group was formed to address the following: The Committee Statement for FR-5054 says "The Technical Committee acknowledges that there is a need to provide clarification for the requirements of the provision of low frequency sounders and visual notification appliances for areas where sleeping may occur, such as but not limited to, bedrooms, living rooms, or other occupiable locations. A Task Group is being formed to address this at Second Draft."

The Committee Statement for CI-5077 says "The Technical Committee acknowledges that there is a need to provide clarification for the requirements of the provision of low frequency sounders and visual notification appliances for areas where sleeping may occur, such as but not limited to, bedrooms, living rooms, or other occupiable locations. A Task Group is being formed to address this at Second Draft."

Item 19-7-10. Review Dates and Times for Future Meetings/Conference Calls

All dates concerning the NFPA 72-2022 (A2021) review cycle can be seen on the NFPA web site: www.nfpa.org\72 - Next edition tab – top of page under revision cycle.

Item 19-7-11. Adjournment and Closing Remarks

A motion was made and seconded to adjourn July 23, 2019 at 11:03 AM EST.
David Lowrey, Chair SIG-NAS, thanked the committee members for their participation.

Submitted by: David E. Becker, Principal

Principal members in attendance:

Lowrey, David (Chair)	City of Boulder Fire Rescue
Becker, David (Secretary)	National Association of Fire Equipment Distributors
Braam, Jan	UTC Climate, Controls & Security/Edwards
Dressler, David	International Brotherhood of Electrical Workers
Edwards, Michael	US Architect of the Capitol
Lewis, Steven	RFI Enterprises
Madole, David	University of Texas at Austin
Newhouse, David	National Electrical Manufacturers Association
Pilette, Maurice	Mechanical Designs Ltd.
Poole, Andrew	Poole Fire Protection, Inc.
Schifiliti, Robert	R. P. Schifiliti Associates, Inc.
Schmitt, Michael	Illinois Fire Inspectors Association
Swanson, John	Minnesota State Fire Marshal Division

Alternate members in attendance:

Accosta, Robert	Arup
Hamilton, Mark	Siemens, Inc.
Mongeau, James	Automatic Fire Alarm Association, Inc.
Newsome, Leon	National Electrical Manufacturers Association
Panowitz, Scott	Fire Suppression Systems Association
Stoops, Morris	UTC, Fire & Security/Edwards

Guests in attendance:

Grosch, Dan	UL
Dybas, Mike	Sytems Sensor
Knisely, Tim	AFAA

NFPA Staff in attendance:

Moreno, Laura	National Fire Protection Association
Ing, Alex	National Fire Protection Association
Roux, Richard	National Fire Protection Association

Committee Input No. 5036-NFPA 72-2019 [New Section after 18.3.6]

18.3.7* Notification Appliance Circuits.

Notification Appliance Circuits (NACs) shall be designed, installed and tested as follows:

18.3.7.1 DC NACs (DCNACs) shall be based on the Control Unit Start Terminal Voltage (CUSTV) of the power source and the low voltage current specifications of the appliances.

18.3.7.2 Audio AC NACs (ACNACs) shall be based on a 0.5 dB electrical loss.

18.3.7.3 The End-Line-Loaded (ELL) or Point-To-Point (PTP) method shall be used.

18.3.7.3.1 End-Line-Loaded (ELL) circuits shall be designed and tested for total circuit resistance and power loss.

18.3.7.3.2 Point-To-Point (PTP) circuits shall be designed and tested for each segment and total circuit resistance and power loss.

[See attachment for annex material]

Supplemental Information

File Name	Description	Approved
72_SIG-NAS_CI5036_A.18.3.7_TG_Report_and_Supporting_Figures.docx	This is the full Task Group report that this committee input is based on.	
72_SIG-NAS_CI5036_A.18.3.7.1564692162207_RJR.docx	Changed may to might. Add non-Control Unit (non-CU).	

Submitter Information Verification

Committee: SIG-NAS

Submittal Date: Mon Jul 22 14:08:33 EDT 2019

Committee Statement

Committee Statement: Many NACs are not designed, installed, tested or maintained properly. This new section is intended to provide the designer guidance on proven and repeatable methodologies that can be applied to systems. This work is part of the NFPA 72 Task Group on Notification Appliance Circuits. The Task Group will continue to work on this material before the Second Draft Meeting. This CI incorporates PI 338 and PI 586.

Response Message: CI-5036-NFPA 72-2019

Public Input No. 586-NFPA 72-2019 [New Section after A.18.1.5]

Public Input No. 338-NFPA 72-2019 [New Section after 18.3.2]

Ballot Results

This item has not been balloted

Committee Input No. 5041-NFPA 72-2019 [Section No. 18.4.4.1]

18.4.4.1 *

To ensure that audible public mode signals are clearly heard, unless otherwise permitted by 18.4.4.2 through 18.4.4.5, they shall have a sound level at least 15 dB ~~above~~ , but not exceed 35 dB, above the average ambient sound level or 5 dB above the maximum sound level having a duration of at least 60 seconds, whichever is greater, measured 5 ft (1.5 m) above the floor in the area required to be served by the system using the A-weighted scale (dBA).

Submitter Information Verification

Committee: SIG-NAS

Submittal Date: Mon Jul 22 15:16:48 EDT 2019

Committee Statement

Committee Statement: Many fire alarm systems installed in buildings are over-designed and excessively loud for the building occupants. The intent of this Committee Input is to encourage designers to evaluate the operation of audible fire alarm appliances to ensure the decibel level is not excessive. This proposed change will give code officials a clear code section to cite when they encounter a fire alarm system that is too loud, but under the maximum allowed of 110 dB. The Task Group on Amplification will continue to review this topic and will present at the Second Draft Meeting.

Response Message: CI-5041-NFPA 72-2019

Public Input No. 9-NFPA 72-2018 [Section No. 18.4.4.1]

Ballot Results

This item has not been balloted

Committee Input No. 5024-NFPA 72-2019 [Section No. 18.5.5.4]

18.5.5.4*

Visual notification appliances listed for ceiling mounting ~~parallel to the floor~~ shall be permitted to be located on the ceiling or suspended below the ceiling.

18.5.5.5

The minimum height of a visual notification appliance listed for ceiling mounting shall be 80 in. (2.03 m) or the actual ceiling height, whichever is less.

A.18.5.5.4

Visual notification appliances must be listed for either wall mounting or ceiling mounting. The effectiveness of ceiling-mounted appliances does not depend on them being mounted on a surface. Therefore, the Code permits them to be suspended below the ceiling using proper electrical installation methods. Appliances mounted parallel to the floor, whether on a ceiling or suspended, can sometimes significantly reduce installation costs and provide better coverage.

In convention spaces and areas with racking and shelving, wall-mounted appliances are frequently obstructed or subjected to mechanical damage. Ceiling mounting (or suspending) the appliances can prevent problems and increases the ability for the appliance to cover the floor area through direct and indirect signaling. See A.18.5.4.

Submitter Information Verification

Committee: SIG-NAS

Submittal Date: Mon Jul 22 11:34:33 EDT 2019

Committee Statement

Committee Statement: Currently, a minimum height does not exist in the Code, and confusion exists as identified by PI 126.

Response Message: CI-5024-NFPA 72-2019

Ballot Results

This item has not been balloted

Committee Input No. 5035-NFPA 72-2019 [Section No. 18.11]

18.11* Standard Emergency Service Interface.

Where required by the enforcing authority; governing laws, codes, or standards; or other parts of this Code, annunciators, information display systems, and controls for portions of a system provided for use by emergency service personnel shall be designed, arranged, and located in accordance with the requirements of the organizations intended to use the equipment.

Submitter Information Verification

Committee: SIG-NAS

Submittal Date: Mon Jul 22 13:59:07 EDT 2019

Committee Statement

Committee Statement: Note to the Correlating Committee: The SIG-NAS Technical Committee believes this requirement and its associated annex material has value and should remain in NFPA 72. Because it includes more than just notification appliances such as annunciators, it should be under the jurisdiction of the Fundamentals committee.

Response Message: CI-5035-NFPA 72-2019

Public Input No. 245-NFPA 72-2019 [Section No. 18.11]

Public Input No. 246-NFPA 72-2019 [Section No. A.18.11]

Ballot Results

This item has not been balloted

Committee Input No. 5077-NFPA 72-2019 [Section No. A.18.4.6.3]

A.18.4.6.3

The intent of this section is to require the use of the low frequency signal in areas intended for sleeping and in areas that might reasonably be used for sleeping. For example, this section requires a low frequency audible signal in a bedroom of an apartment and also in the living room area of an apartment as it might have sleeping occupants. However, it would not be required to use the low frequency signal in the hallways, lobby, and other tenantless spaces. In hotels, the guest rooms would require use of the low frequency signals, but other spaces that might require audible signals could use any listed audible appliances regardless of the frequency content of the signal being produced. This chapter of the Code addresses notification appliances connected to and controlled by a fire alarm or emergency communications system. This chapter does not address dwelling unit protection such as smoke alarms and their audible signal characteristics. Requirements for single- and multiple-station alarms and household fire alarm systems can be found in Chapter 29.

It is not the intent of this section to preclude devices that have been demonstrated through peer-reviewed research to awaken occupants with hearing loss as effectively as those using the frequency and amplitude specified in this section.

Non-voice (e.g., horns) notification appliances should be listed as a “low frequency alarm” alarm appliance. Voice appliances and systems should be capable of 520 Hz ±10 percent with the appropriate harmonics.

For increased protection in the sleeping area, tactile notification in accordance with Section 18.10 might be an effective means of awakening those who have normal hearing, as well as those who are hearing impaired.

Submitter Information Verification

Committee: SIG-NAS

Submittal Date: Tue Jul 23 09:13:54 EDT 2019

Committee Statement

Committee Statement: The Technical Committee acknowledges that there is a need to provide clarification for the requirements of the provision of low frequency sounders and visual notification appliances for areas where sleeping may occur, such as but not limited to, bedrooms, living rooms, or other occupiable locations. A Task Group is being formed to address this at Second Draft.

Response Message: CI-5077-NFPA 72-2019

Ballot Results

This item has not been balloted

Committee Input No. 5066-NFPA 72-2019 [Section No. I.1.2.14]

I.1.2.14 UL Publications.

Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

ANSI/UL 268, *Standard for Smoke Detectors for Fire Alarm Systems,* 6th edition, 2009.

ANSI/UL 268A, *Standard for Smoke Detectors for Duct Application*, 4th edition, 2008, revised 2016.

ANSI/UL 827, *Standard for Central-Station Alarm Services*, 2014.

ANSI/UL 864, *Standard for Control Units and Accessories for Fire Alarm Systems*, 9th edition, 2003, revised 2012.

ANSI/UL 1638, *Visible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories*, 5th edition, 2016.

ANSI/~~UL 1971, *Standard for Signaling Devices for the Hearing Impaired,* 3rd edition, 2002, revised 2013.ANSI/~~ UL 2075, *Standard for Safety Gas and Vapor Detectors and Sensors*, 2013.

ANSI/UL 2572, *Mass Notification Systems*, 2nd edition, 2016.

Submitter Information Verification

Committee: SIG-NAS

Submittal Date: Tue Jul 23 08:45:07 EDT 2019

Committee Statement

Committee Statement: The SIG-NAS committee has removed all references to UL 1971 in A.18. If the SIG-HOU committee removes the reference from A.29.5.10.2, then this citation should be removed.

All visual signal requirements have been moved into UL 1638. UL 1638 contains both public and private mode signaling requirements for visual signals. The Listing category for public mode visual signals still remains as UUKC, Signaling Appliances for the Hearing Impaired.

Response Message: CI-5066-NFPA 72-2019

Ballot Results

This item has not been balloted

Public Comment No. 283-NFPA 72-2020 [Section No. 18.1]

The Technical Committee is advised to review the new Chapter 11 on cybersecurity and determine whether it should be referenced in the Application statement for this Chapter.

18.1* Application.

18.1.1

The requirements of this chapter shall apply where required by the authority having jurisdiction governing laws, codes, or standards; or other parts of this Code.

18.1.2

The requirements of this chapter shall address the reception of a notification signal and not the signal's information content.

18.1.3

The performance, location, and mounting of notification appliances used to initiate or direct evacuation or relocation of the occupants, or for providing information to occupants or staff, shall comply with this chapter.

18.1.4

The performance, location, and mounting of annunciators, displays, and printers used to display or record information for use by occupants, staff, responding emergency personnel, or supervising station personnel shall comply with this chapter.

18.1.5*

The requirements of this chapter shall apply to the areas, spaces, or system functions where required by the authority having jurisdiction governing laws, codes, or standards; or other parts of this Code requiring compliance with this chapter.

18.1.6

Notification appliances shall be permitted to be used within buildings or outdoors and to target the general building, area, or space, or only specific parts of a building, area, or space designated in specific zones and sub-zones.

18.1.7

The requirements of Chapters 10, 14, 23, and 24 shall apply to the interconnection of notification appliances, the control configurations, the power supplies, and the use of the information provided by notification appliances.

Additional Proposed Changes

File Name	Description	Approved
CorrelatingNoteNo._79.pdf	NFPA 72 - CN No. 79	

Statement of Problem and Substantiation for Public Comment

NOTE: This Public Comment appeared as Correlating Committee Note No. 79 in the First Draft Report.

The Technical Committee is advised to review the new Chapter 11 on cybersecurity and determine whether it should be referenced in the Application statement for this Chapter.

Related Item

• CN No. 79

Submitter Information Verification

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Submittal Date: Wed May 06 15:11:49 EDT 2020
Committee: SIG-NAS

Public Comment No. 122-NFPA 72-2020 [New Section after 18.1.7]

18.1.8

The requirements of Chapter 11 shall apply to this chapter.

Statement of Problem and Substantiation for Public Comment

Cybersecurity measures should be applied to notification appliances to mitigate security threats.

Related Item

• correlcomm note #79

Submitter Information Verification

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Committee: SIG-NAS

Public Comment No. 282-NFPA 72-2020 [New Section after 18.3.6]

Notification Appliance Circuit

Type your content here ...

Additional Proposed Changes

File Name	Description	Approved
Life_Safety_System_Notification_Appliance_Circuit_050620ms2.docx	Supporting documentation for PC	

Statement of Problem and Substantiation for Public Comment

Task Group Input

Related Item

• PI 338

Submitter Information Verification

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Submittal Date: Wed May 06 15:10:04 EDT 2020
Committee: SIG-NAS

Emergency Communication, Life Safety & Fire Alarm Systems Notification Appliance Circuit (NAC) Design

DRAFT

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DRAFT

Forward

The information in this document is planned to be added to the NFPA 72-2022 *National Fire Alarm and Signaling Code.* For the 2022 edition, this will include some code body and code annex material. Actual placement and implementation will be determined by the NFPA 72 Chapter 18 Committee.

Some design guidance material was in the Annex in earlier editions of NFPA 72, but had been removed during the course of previous code development. The current Chapter 18 Committee deemed that this subject needs to be reinserted and expounded upon.

The new Control Unit Start Terminal Voltage (CUSTV), Module Voltage Adjustment (MVA), and Module Insertion Loss (MIL) requirements that will require changes in Nationally Recognized Testing Laboratories (NRTL) procedures, documentation and testing as well as changes in how systems are designed, installed and tested.

These terms and the format they are in are an extension and clarification of UL 864 10th edition 96.6 (d) (3) relative to Direct Current Notification Appliance Circuits (DNACs). For Audio Notification Appliance Circuits (ANACs), the UL 864 10th edition relevant sections are 65.10 and 65.11.

The UL requirements for marking and documenting the DC circuit information became mandatory in 2008; however, there is no prescribed format for how this information is to be displayed or utilized. It should be noted that information in the field and how the available information is to be used has been inconsistent. When the information is available, some manufacturers say a maximum X ohms per wire, some say a maximum of X ohms for the circuit and some provide actual voltage values. For consistency and for ease of testing and maintenance, the Task Group has selected the use of voltage values and measurements for DNACs and total dB Loss for ANACs.

The typical information in the field today also does not really provide clear guidance on how to calculate NACs end-to-end, which includes all environments, line losses, risers, equipment and other variables, which make it more difficult to design, install, evaluate and service systems.

ANACs have not generally been flagged as a major problem from a *performance* standpoint in the past as ANACs are usually “forgiving” and allow for a greater degree of error as compared to a DNAC. ANACs will typically still have some output even if the circuit is not designed or installed correctly and the circuit *may* pass inspection because of the headroom that is typically in an ANAC. A 0.5 dB electrical loss on a circuit translates into about a 12.5% output loss.

There is now a movement to tighten up the output characteristics of system so that they do not “overpower” a protected area. If that happens, headroom may not be available and it is much better to find out that there is an issue in design before the system is actually installed and then tested.

From an AHJ and design community standpoint, this document will provide the both with consistent tools to design and evaluate NACs.

Some of the goals of this effort are to:

- Provide the installers, the design community and AHJs with common terms and consistent formats for data relative to NACs design, installation and testing.
- Provide information in a format that NRTLs can use to correlate equipment standards to 72.

This document does not provide guidance on addressable or similar technology appliances and circuits. Information on Special Application, Addressable Notification or other systems/circuits/appliances must come from the manufacturer.

Anticipated impact to manufacturers and NRTLs:

- Manufacturers will have to adjust their DNAC values to be in the new common voltages format. This should be a paperwork submittal for most manufacturers and should not require equipment resubmittals.
- Manufacturers and NRTLs will need to work out the details of ANACs. This may be able to be done as part of modification to existing equipment standards or it may require development of new standards. Equipment would have to be submitted for the new certifications.
- Manufacturers and NRTLs will need to work out the details of Control Module MVA and MIL as there is currently no viable field-useable documentation for these. This may be able to be done as part of modification to existing equipment standards or it may require development of new standards. Equipment would have to be submitted for the new certifications.

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Abstract

Summation of important criteria and methods to properly design and test Notification Appliance Circuits (NACs). This document addresses the best practices for NACs. These are:

- Using the correct Control Unit Start Terminal Voltage (CUSTV)
- Using the correct Module Voltage Adjustment/Module Insertion Loss (MVA/MIL)
- Using the correct appliance voltages
- Use the correct installation temperatures
- Use the correct conductor values
- Applying correct design and testing requirements for NACs
- Updating format on line-loss characteristics

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Background

Notification Appliance Circuits (NACs) have been part of fire alarm and life safety systems almost since they were electrified. Emergency Communication, Fire Alarm and Life Safety Systems rely heavily on proper NAC operation to provide authorized information to personnel when needed. However, at times, varying and inconsistent design parameters have been used for systems. These include, but are not limited to:

- Incorrect circuit terminal starting voltages
- Incorrect end voltages
- Incorrect appliance power consumption
- Incorrect circuit parameters (length, wire gauge, wire types, etc.)
- Failure to account for three-dimensional travel of installed circuit (rise, drop, slack, service bundles, etc.)
- Failure to include riser power losses
- Failure to account for installation and operational environmental conditions

System testing has also been inconsistent. This includes, but is not limited to:

- Testing only on ac mains power
- Failure to properly test Class A/Class X operation
- Failure to properly measure circuit electrical characteristics, such as:
    - Installed circuit terminal starting voltages
    - Quiescent and active end-of-line voltages
    - Installed circuit current draw
    - Installed circuit total resistance before appliances are installed
- Failure to calibrate the audio paths end-to-end

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Characteristics

The subject of proper design, installation, testing, operation, and maintenance of NACs is one that requires knowledge of codes/regulations, physics, design parameters, installation methodologies, materials, and system operations.

This document relates to non-addressable copper conductor-based architecture and technologies that are in the marketplace as of the date of this writing. Addressable notification solutions that used combined data and power on the same conductors must use information provided by the manufacturer.

Some of the topics that must be understood are:

1. NRTL-classified Regulated versus Special Application circuits. Note that the NRTL Regulated term is independent of the term regulated as it applies to power supplies and power circuits (i.e. filtered/regulated power).
2. Special Application and Addressable Notification systems, circuits & appliances, information must be secured from the manufacturer.
3. Electrical characteristics of NACs (certain topics are expounded upon in subsequent subsections):
    a. Notification Appliances
        i. Performance requirements
        ii. Power consumption
    b. Conductors
        i. Conductive material
            1. Solid copper
            2. Stranded copper
        ii. Operating temperature
            1. AWG temps (68 & 167 F)
        iii. Insulation
            1. Temperatures
        iv. Construction
            1. Twisted conductors
            2. Shielding
        v. Values
            1. Capacitance

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2. Resistance
3. Inrush

c. Circuit types
   i. DC
      1. Full-wave rectified (FWR)
      2. Filtered-regulated (F/R)
   ii. AC (Audio)

d. Power sources
   i. Inrush characteristics
   ii. Low system voltage
   iii. Start terminal voltage

4. Design parameters
   a. End-line loading (ELL)
   b. Point-to-point (PTP)
   c. Circuit length
      i. How to measure Class A/X
      ii. 3-dimensional aspects
         1. Run
         2. Rise
         3. Drop
         4. Twisting
         5. Slack
         6. Service loops
5. Installation methods
   a. Class B
   b. Class A
   c. Class X
   d. Survivability
   e. Support
   f. Terminations

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   g. Splicing
6. System testing
   a. On AC mains power
   b. Low line voltage cutover
   c. On secondary power
   d. Circuit operation
7. ANAC calibration processes
   a. Audio sources
   b. Audio pathways
   c. ANAC
8. System operations
   a. Supervision
   b. Synchronization
      i. Visual
      ii. Audible
   c. Activation/De-activation
   d. Control

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New 72 Code Body Sections

18.3.7 **Notification Appliance Circuits**

18.3.7.1 Conventional (non-addressable) Notification Appliance Circuits (NACs) shall be designed, installed and tested in accordance with Sections 18.3.7.1.1 through 18.3.7.3.2.

18.3.7.1.1 DC NACs (DNACs) shall be based on the Control Unit Start Terminal Voltage (CUSTV) of the power source and the low voltage current specifications of the appliances.

18.3.7.1.2 Audio NACs (ANACs) shall be based on a 0.5 dB electrical loss.

18.3.7.1.3 NAC circuits that use field-installed Control Modules (CM) shall be accounted for in all circuit design, testing and maintenance.

18.3.7.1.3.1 Module Voltage Adjustment (MVA) for DC NAC CMs, when used, shall be factored into each circuit.

18.3.7.1.3.2 Module Insertion Loss (MIL) for Audio NAC CMs, when used, shall be factored into each circuit.

18.3.7.1.3.3 CMs are permitted to be dually rated for MVA and MIL when the modules are designed and Listed for that DC and Audio NAC use.

18.3.7.1.4 All NACs shall be designed for a minimum of 167 F (75C), or the expected circuit operating temperature if the circuit will be subjected to temperatures above 167 F (75C).

18.3.7.2 Addressable Notification Appliance subsystems or systems shall be designed, installed and tested as Signaling Line Circuits.

18.3.7.3 End-Line-Loaded (ELL) or Point-To-Point (PTP) method.

18.3.7.3.1 End-Line-Loaded (ELL) circuits shall be designed and tested for total circuit resistance and power loss.

18.3.7.3.2 Point-To-Point (PTP) circuits shall be designed and tested for each segment and total circuit resistance and power loss.

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New 72 Code Annex

A18.3.7

Notification Appliances. The goal of a properly designed, installed and maintained system is to ensure that the notification appliances will operate at the required output (sound pressure level, candela output, synchronization, etc.) and durations during expected system operations.

A key component of a notification appliance is its power consumption. The designer must account for the minimum and maximum power specifications of an appliance. Regulated "24VDC" appliances must operate at a low of 16 VDC and at a maximum of 33 VDC in order to ensure its output characteristics are correct. For example, too low of a voltage at the appliance may result in visual appliances losing synchronization or audible appliances having low or no output.

When designing DNACs the appliance nameplate (Listed) voltage and current consumption values are used. This will typically be X mA @ 16 VDC.

For ANACs, the appliance voltage and wattage settings will provide a given output. This will typically be Y dBA-fast @ 25.2 or 70.7 VAC.

Conductors. Copper conductors are used with systems. This copper can be solid or stranded. The resistance differences between solid and stranded can be 8%.

When designing a NAC, the designer must also look at the environment where the circuits and appliances will be installed. Wire resistance changes with temperature. For single-strand (run in pairs) standard copper wire, the difference between the 2 most common design wire temperature of 68 F (20C) and 167 F (75C) is a significant 26%. 167 F (75C) is the minimum circuit design temperature.

For installations that utilize special cabling, such as, but not limited to cable assemblies and Circuit Integrity (CI) cable, the manufacturer's conductor characteristics and installation specifications should be followed.

The following charts provide the resistance values for a non-cable assembly pair (e.g. pair of THHN) solid and stranded copper wire at 167 F.

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Wire resistance @ 167F (75C)		
Wire	Pair 1K	Ohm/wire/1K
10 Solid	2.52	1.26
10 Stranded	2.58	1.29
12 Solid	4.02	2.01
12 Stranded	4.1	2.05
14 Solid	6.38	3.19
14 Stranded	6.52	3.26
16 Solid	10.16	5.08
16 Stranded	10.58	5.29
18 Solid	16.16	8.08
18 Stranded	16.9	8.45

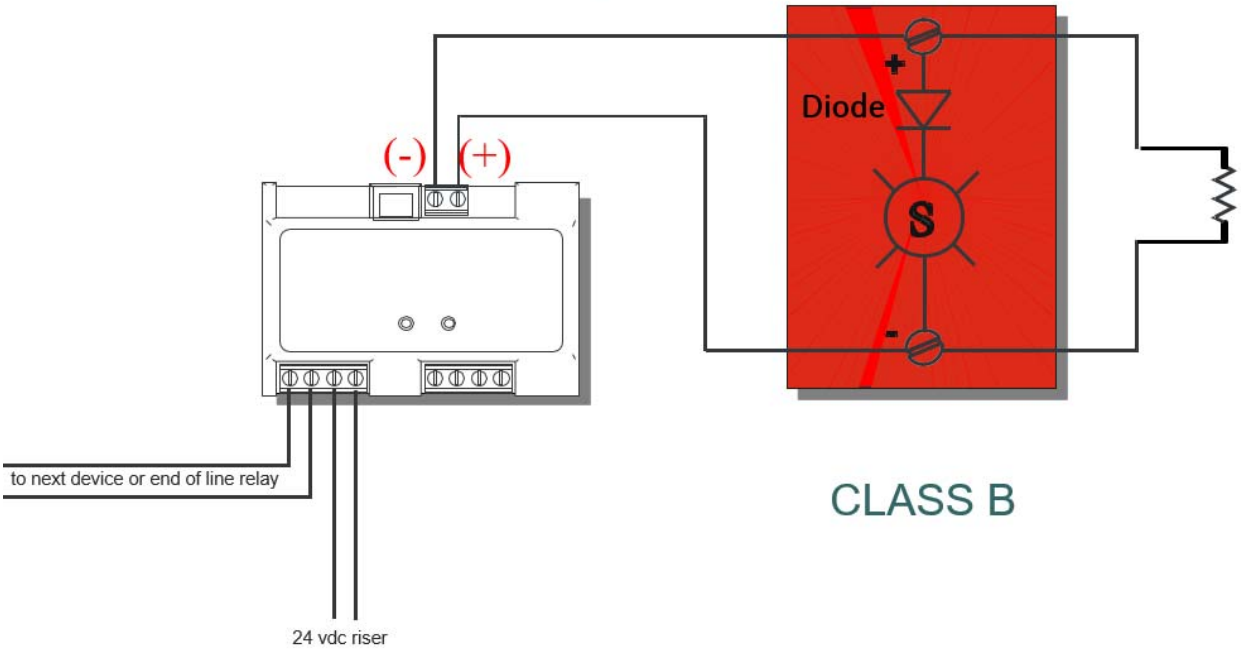
Conductor insulation performance can also vary with temperature. Temperature may impact the stability of the insulation, the capacitance of the circuit and possibly more. The wire manufacture's information should be reviewed.

Conductor/cable assembly may also impact the circuit performance. For audio and many other circuits, the system manufacturer may specify that twisted cable is required. Others may specify that the circuit must be shielded. Twisted cable may have higher resistance values that non-twisted cables or conductors due to the longer lengths of the actual conductors in each foot of cable length.

Circuit Types. For "DC" circuits, there are typically Filtered/Regulated (F/R), also informally referred to as clean DC (note, the Regulated here has nothing to do with the NRTL "regulated" term), and Full-Wave Rectified (FWR). FWR, which has also been informally referred to as "lumpy DC," is the power output of some systems when the unit is being powered by ac mains, but will typically change to F/R when the system is on battery power.

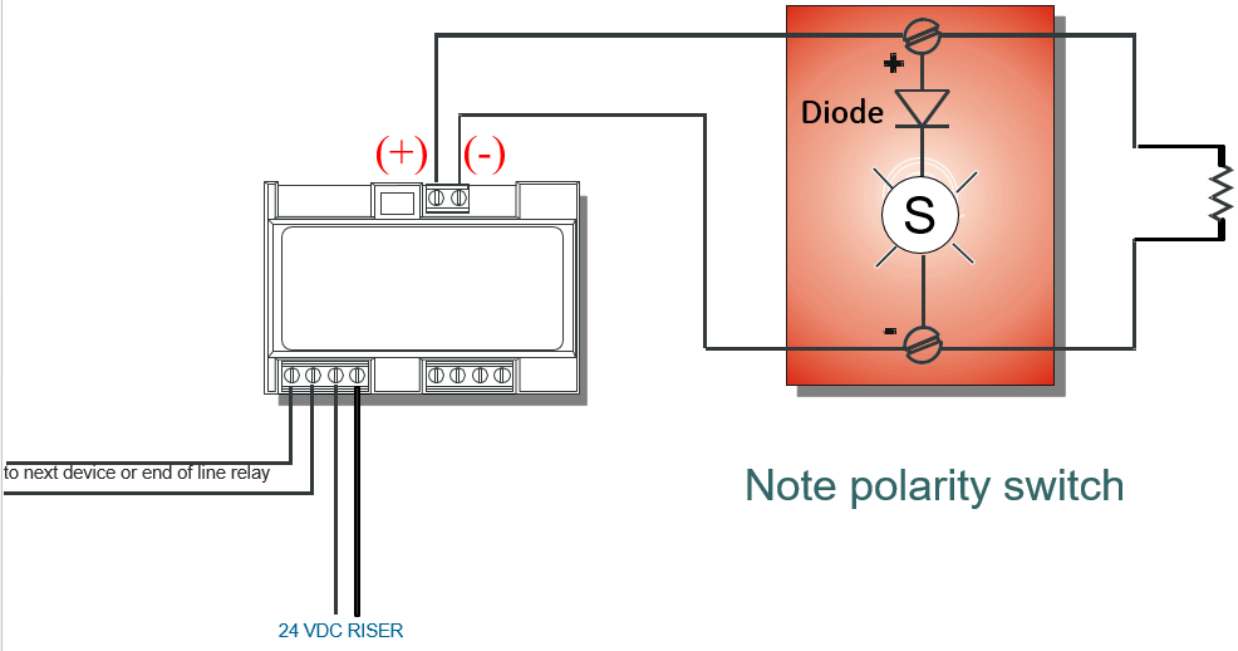
Typical DC notification appliances typically have a blocking diode in them. When the NAC is in quiescent mode, the circuit polarity is in one direction, which is blocked by the diode. When the circuit is activated, the polarity is revered and now the diode allows the energy to flow into the appliance.

NAC circuit shown in supervisory mode



CLASS B

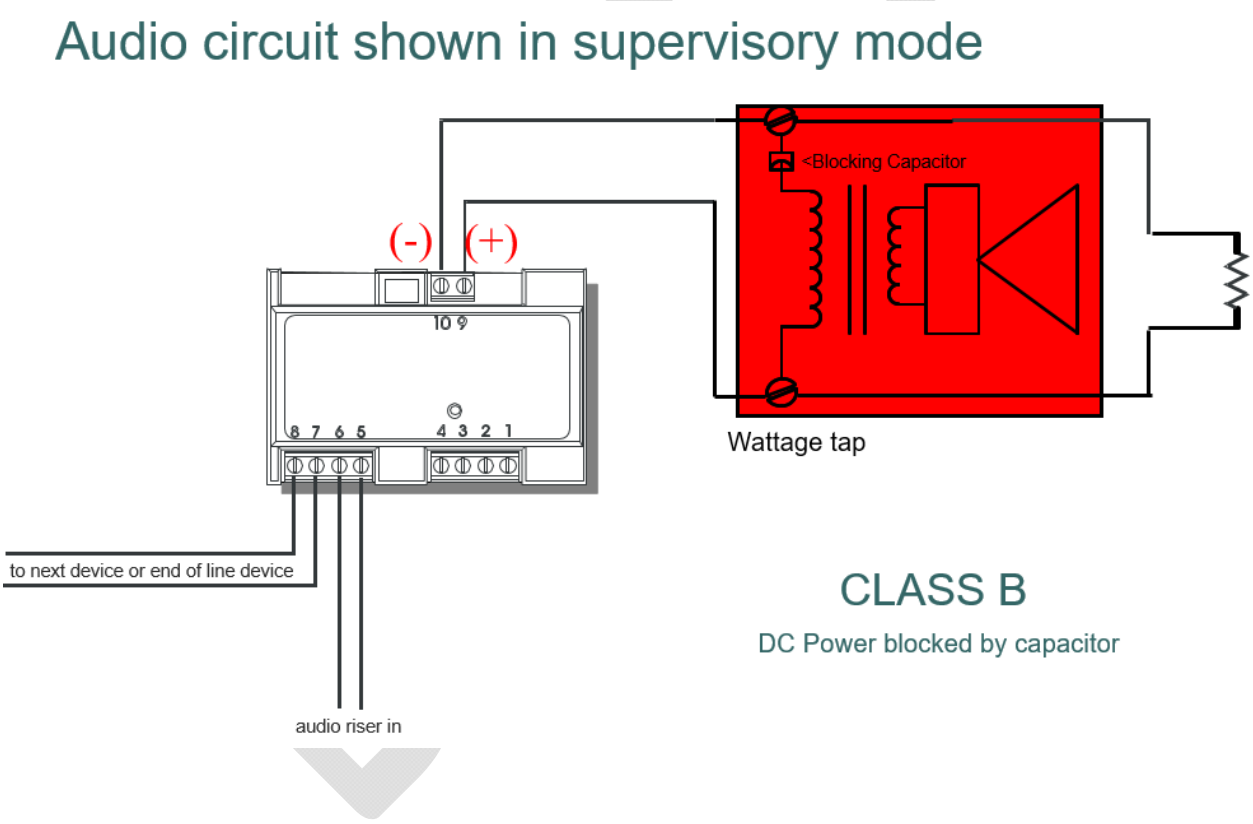
NAC circuit shown in an activated mode



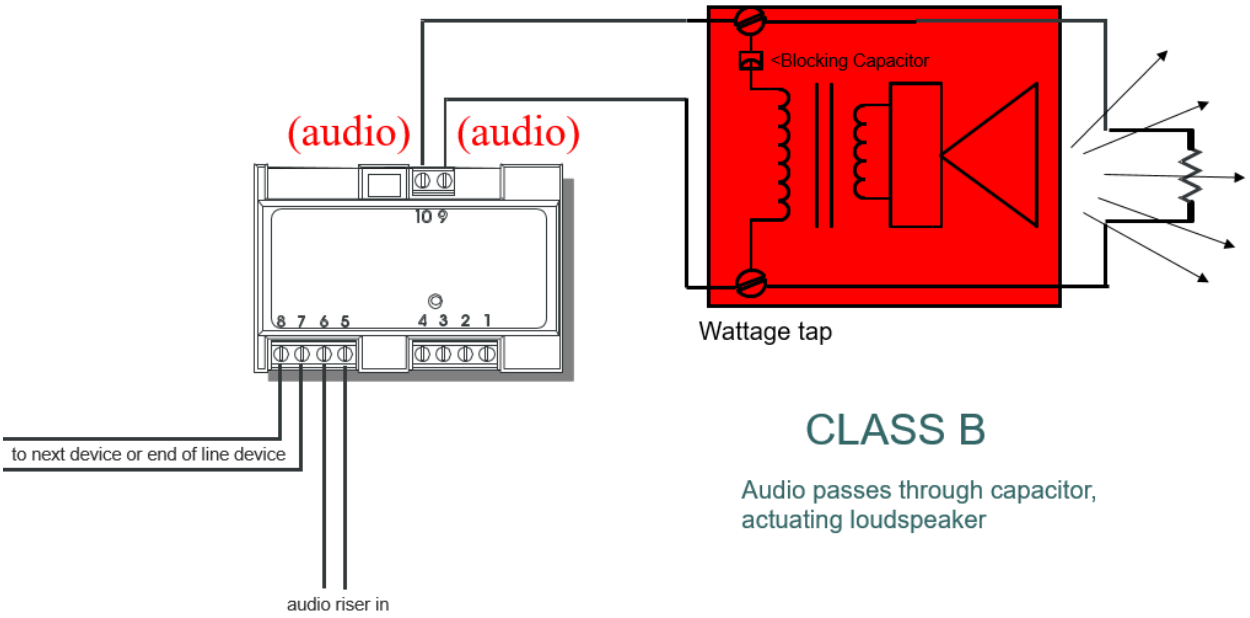
Note polarity switch

Audio (AC) circuits are typically rated at 25.2 (nominal 25) or 70.7 (nominal 70) in North America. In some other countries, different voltages (such as 100) may also be used. ANACs typically operate in quiescent mode with DC supervision and then AC (audio) is applied to the circuit when the circuit is activated. Audio circuits/appliances are typically powered by audio power amplifiers.

Typical Listed audio notification appliances have a blocking capacitor in them to block the DC supervisory power, but permit the AC audio power to reach the loudspeaker when the circuit is activated.



Audio circuit shown in active mode



Power Sources. The type of power supply will impact the system design and operation. The system output, overcurrent protection methods, loading ratings/factors, inrush capabilities and voltages must be evaluated. Some power supplies may actually have their worst-case output condition at brownout, which is when the incoming AC mains are at its lowest value, just before the power supply transfers to battery power. The manufacturer's documentation and direction should be adhered to.

Control Modules. Some systems use non-Control Unit (FACU, etc.) field-installed Control Modules (CM) to control a NAC. These typically addressable modules provide electrical supervision of the NAC and/or may provide some control of the DC and/or AC power riser coming into the CM. Any module or device that is in the power riser electrical path or that may impact the performance of the riser must be accounted for in the system design, installation and testing. Other examples of some CMs may be, but are not limited to:

- Relays
- Coders
- Supervision
- Synchronization

Design Parameters. This is a key design factor. In the past there have been 3 main types of circuit design methods. They are:

- **End Line Loading -** (ELL) this assumes that all the appliances are at the end of the circuit and are activated at one time. This is the most conservative method and is the recommended design method for all systems.
    - ELL circuits are designed and tested based on the total circuit resistance and loss.
- **Point-To-Point** – (PTP) this method requires that the designer know the exact wire distance between each and every appliance. If the installed values are different than the design values, the circuit may not work correctly. This method requires close coordination with the design and field work.
    - PTP circuits are designed and tested based on the individual segment and total resistance and loss.
- **Load Centering** – this method assumes that 50% of the load is after the midpoint of the circuit and 50% is before the midpoint. This method is not recommended and should not be used.

DNAC Block Diagrams & Scenarios

The following images are of control equipment for a DNAC, but the design parameters are related to that of an ANAC circuit. For ANACs, the information and calculations are provided further on in this document.

For **Figure A**, the notification appliances are connected on supervised NACs to a power and control unit (CU). This may be an FACU or a remote power supply assembly.

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Figure A – NAC Power & Control Unit

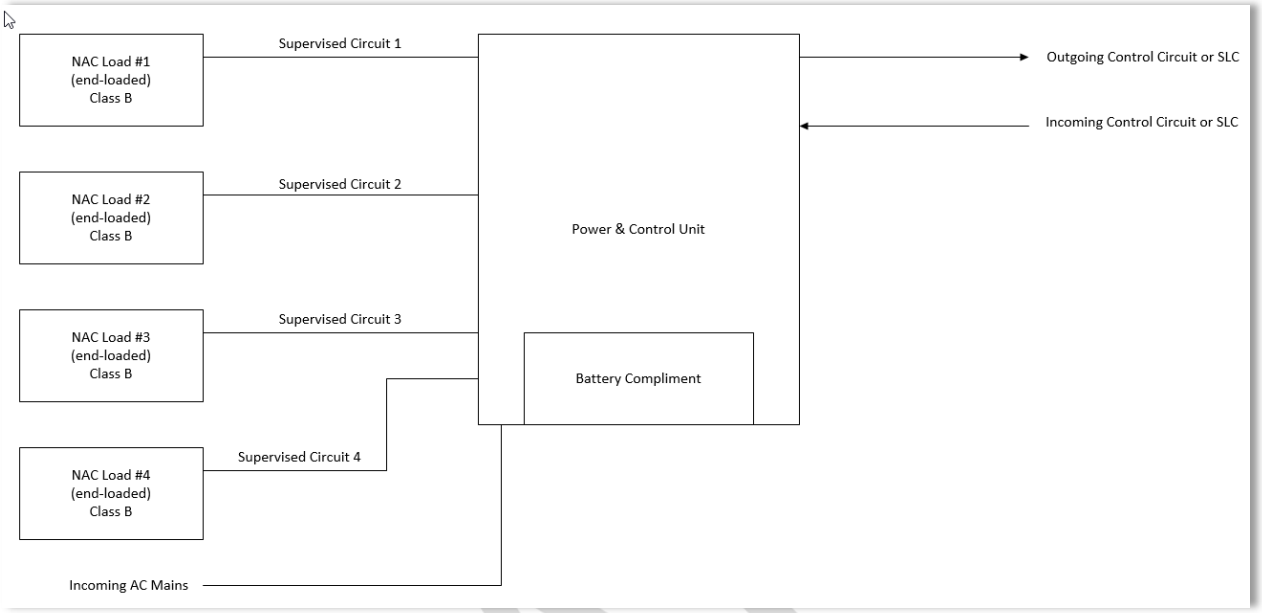
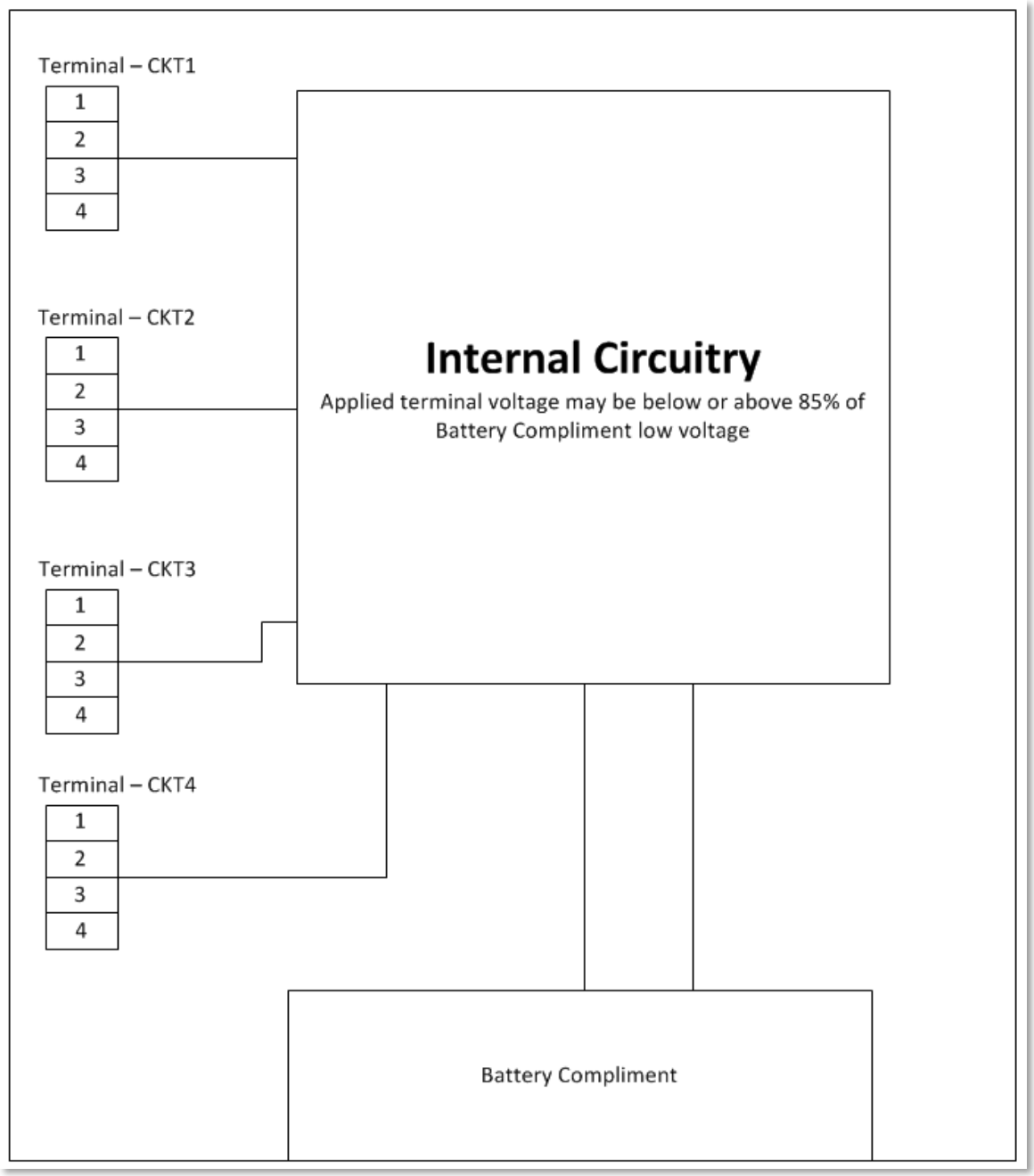


Figure B provides a block diagram of the internal sections of the power/control unit. The important thing here is the Terminals (Terminal – CK1 through Terminal – CK4). This is where the Control Unit Start Terminal Voltage (CUSTV) is derived from. The Internal Circuitry will impact the CUSTV.

As an example, when the CU is on AC mains power, this voltage may be as high as 33 volts. In this case, the circuit would be able to support a voltage drop of 17 volts (33-16 = 17) – which means that typically, most circuits would work.

Now assume that the power supply is operating on battery power, the batteries are at the end of their service life and at the end of their retention time, and then the system is at the end of its activation period. Now the applied voltage may be 18.5 volts, which means the circuit could only support a 2.5 volt drop (18.5-16 = 2.5). The appliances and circuits that work when the unit was on AC mains may not work properly (or at all) when the unit is powered by batteries.

Figure B – Internal NAC Power & Control Unit



Scenario 1 – Standard Technology (End-Line Loading)

- Appliance maximum wire gauge: 12 AWG
- Nominal battery voltage: 24 VDC
- Battery terminal voltage: 20.4 (85% of 24 VDC)
- Internal voltage adjustment of control equipment: -1.3 VDC at load
- NAC Terminal voltage: 20.4-1.3 = 19.1
- Regulated appliance low voltage: 16
- Maximum voltage drop of design circuit: 19.1-16 = 3.1 VDC
- Design circuit current draw of all alliances on NAC: 2.022 A @ 16 VDC
- Project required spare capacity: 20%
- Design circuit load: 2.4264 A
- Design circuit length: 350’
- If design/application is at 167 F, maximum circuit length is 317.81 feet with 12 AWG solid wire. Circuit design is invalid and will not work reliably. Circuit must be redesigned.

Scenario 2 – Advanced Technology (End-Line Loading)

- Appliance maximum wire gauge: 12 AWG
- Nominal battery voltage: 24 VDC
- Battery terminal voltage: 20.4 (85% of 24 VDC)
- Internal voltage drops of control equipment: +2.1 VDC at load
- NAC Terminal voltage: 20.4 + 2.1 = 22.5 VDC
- Regulated appliance low voltage: 16
- Maximum voltage drop of design circuit: 22.5-16 = 6.5 VDC
- Design circuit current draw of all alliances on NAC: 2.022 A @ 16 VDC
- Project required spare capacity: 20%
- Design circuit load: 2.4264 A
- Design circuit length: 550’
- If design/application is at 167 F, maximum circuit length is 666.38 feet with 12 AWG solid wire. Circuit design is valid for 12, but will not work with 14.

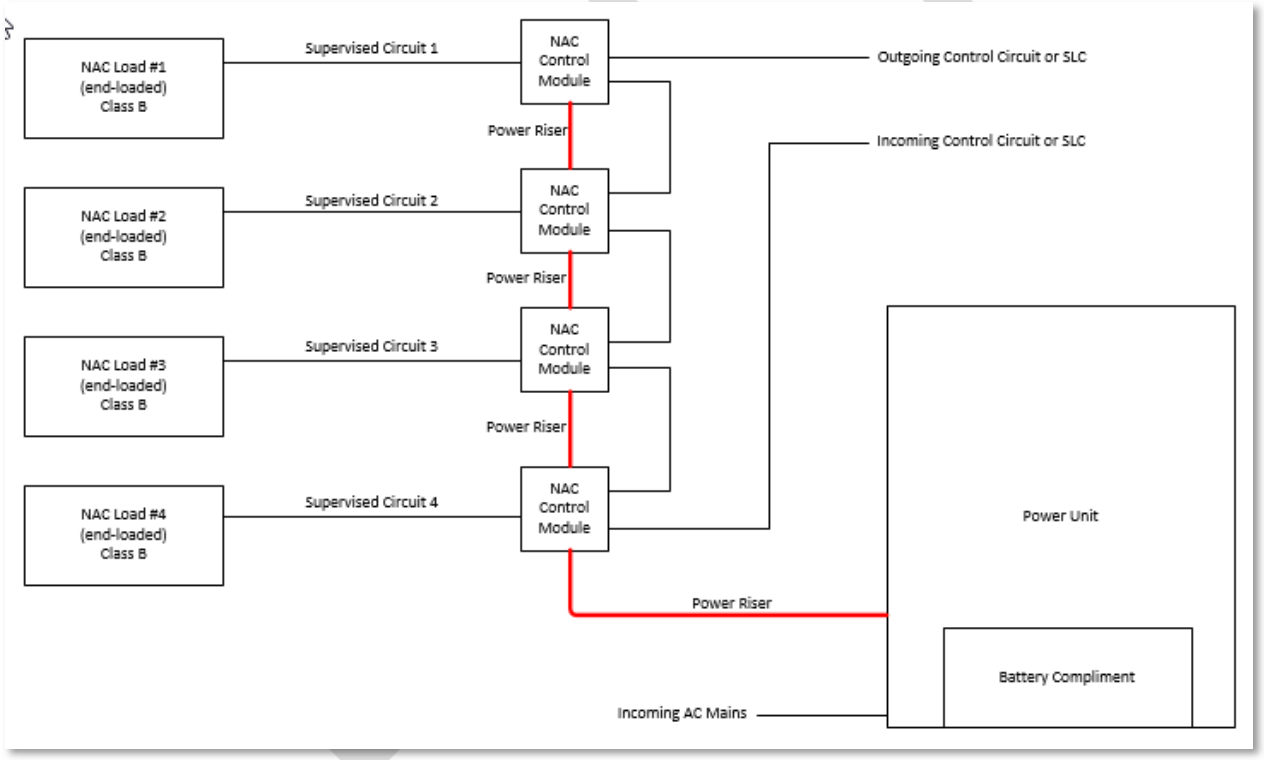
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Scenario 3 – Common Riser To Control Modules

Figure C depicts an application where CMs are installed that are provided power (DC and/or AC) as Riser Power. This application is typical for installations where control modules are installed that are not integral to a CU. They may be away from the control/power unit and are supplied notification power via a common supervised power riser. In this case, all circuits that can be activated in the worst case all enter into the equation as the loading will impact the power riser voltage at each of the NAC Control Modules.

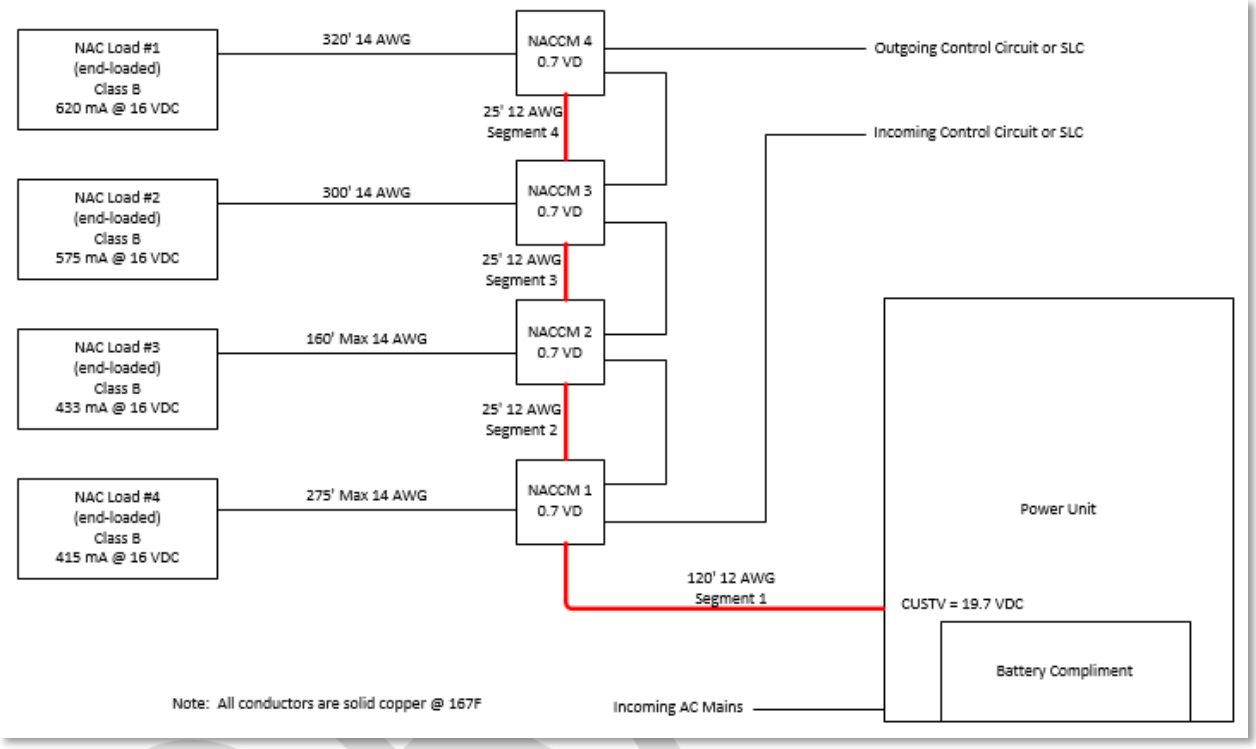
An example would be that a NAC Control Module is installed on each floor of a building to control the appliances on the respective floors and the NAC Control Modules are powered from a common power riser.

Figure C – NAC CM With Power Riser



1. In the example above, a minimum of 2 calculations are required:
    a. The Power Riser loss with all connected circuits active.
    b. The NAC input terminal voltage based on the Power Riser loss.
2. For example, the below layout provides values for the configuration:

Figure D – NAC CM With Values



System Calculations based on a CUSTV of 19.7

NFPA 72 -2022 NAC calc

At 19.7 CUSTV

CU STV	19.7	
CU Max Current	3.5	
NACCM VD	0.7	
Total power (Segment 1):	2.04300	

Segment 2 power:	1.62800	
Segment 3 power:	1.19500	
Segment 4 power:	0.62000	
12 AWG resistance pair/ft.:	0.00402	
14 AWG resistance pair/ft.;	0.00638	
Resistance Segment 1	0.4824	
Resistance Segment 2	0.1005	
Resistance Segment 3	0.1005	
Resistance Segment 4	0.1005	
Resistance NAC 1	1.7545	
Resistance NAC 2	1.0208	
Resistance NAC 3	1.914	
Resistance NAC 4	2.0416	
Segment 1 VD	0.985543	
Segment 2 VD	0.163614	
Segment 3 VD	0.120098	
Segment 4 VD	0.06231	
NACCM 1 riser input voltage	18.71446	
NACCM 2 riser input voltage	18.55084	
NACCM 3 riser input voltage	18.43075	
NACCM 4 riser input voltage	18.36844	

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NACCM 1 STV	18.01446	
NACCM 2 STV	17.85084	
NACCM 3 STV	17.73075	
NACCM 4 STV	17.66844	
NAC 1 VD	0.728118	
NAC 2 VD	0.452214	
NAC 3 VD	1.10055	
NAC 4 VD	1.265792	
		EOLV > 16 VDC?
NAC 1 EOLV	17.28634	Yes
NAC 2 EOLV	17.39863	Yes
NAC 3 EOLV	16.6302	Yes
NAC 4 EOLV	16.40264	Yes

If a different Control Unit was used that had a CUSTV of 19.1 versus 19.7, the system will not work as designed:

NFPA 72 -2022 NAC calc

At 19.1 CUSTV

CU STV	19.1	
CU Max Current	3.5	
NACCM VD	0.7	
Total power (Segment 1):	2.04300	
Segment 2 power:	1.62800	
Segment 3 power:	1.19500	
Segment 4 power:	0.62000	

12 AWG resistance pair/ft.:	0.00402	
14 AWG resistance pair/ft.;	0.00638	
Resistance Segment 1	0.4824	
Resistance Segment 2	0.1005	
Resistance Segment 3	0.1005	
Resistance Segment 4	0.1005	
Resistance NAC 1	1.7545	
Resistance NAC 2	1.0208	
Resistance NAC 3	1.914	
Resistance NAC 4	2.0416	
Segment 1 VD	0.985543	
Segment 2 VD	0.163614	
Segment 3 VD	0.120098	
Segment 4 VD	0.06231	
NACCM 1 riser input voltage	18.11446	
NACCM 2 riser input voltage	17.95084	
NACCM 3 riser input voltage	17.83075	
NACCM 4 riser input voltage	17.76844	
NACCM 1 STV	17.41446	
NACCM 2 STV	17.25084	
NACCM 3 STV	17.13075	

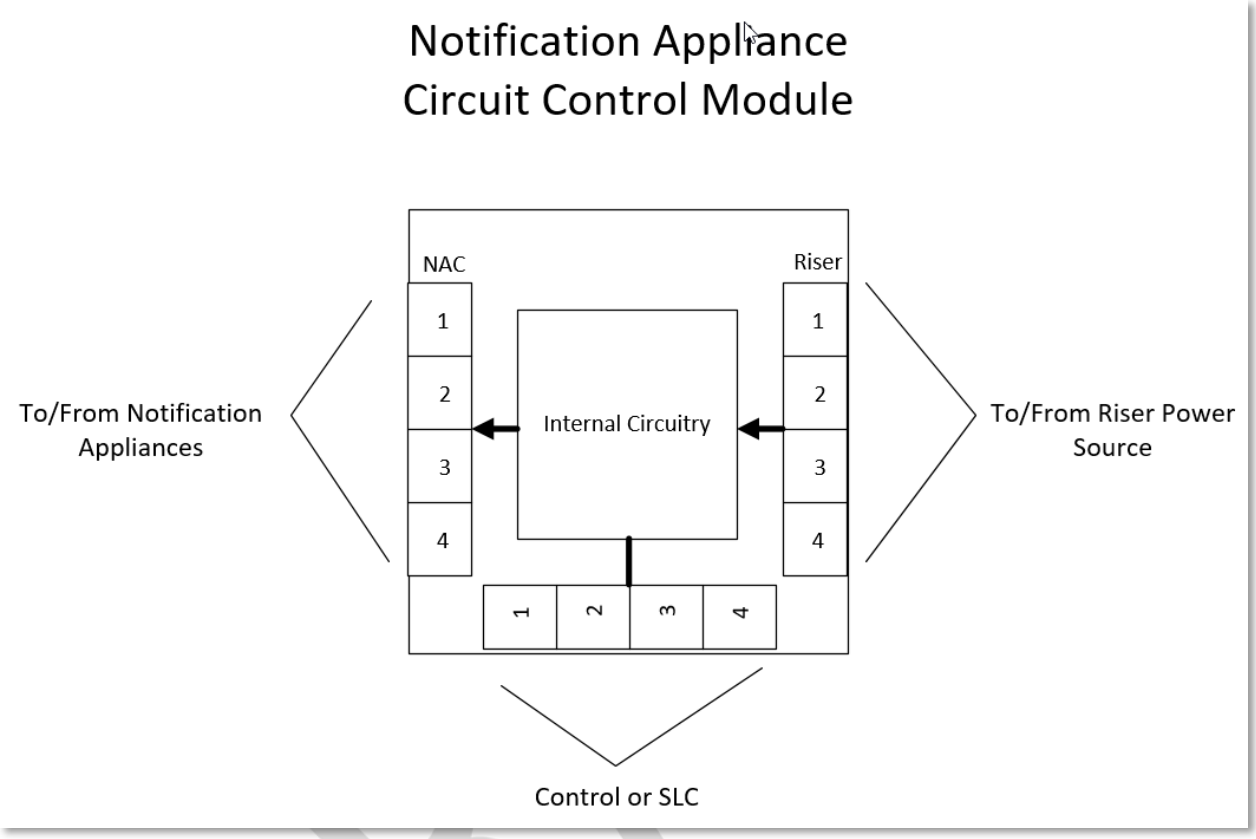
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NACCM 4 STV	17.06844	
NAC 1 VD	0.728118	
NAC 2 VD	0.452214	
NAC 3 VD	1.10055	
NAC 4 VD	1.265792	
		EOLV > 16 VDC?
NAC 1 EOLV	16.68634	Yes
NAC 2 EOLV	16.79863	Yes
NAC 3 EOLV	16.0302	Yes
NAC 4 EOLV	15.80264	No

3. **Figure E** provides a block diagram of the internal sections of a typical NAC CM. the NAC CM may impact the voltage of the connected NAC. This is typically a voltage drop, or some may actually be able to boost the voltage. In either case, in DNACs, this is referred to as Module Voltage Adjustment (MVA) and must be accounted for in the overall system design.

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Figure E – NAC CM Internal Block Diagram



For a Control Module on a DNAC, the following is the formula for the unit:

CMSTV = Riser Terminal -/+ Internal Circuitry

Example with Values:

17.41446 = 18.11446-0.7

Audio Circuits (ANACs)

Audio circuits, when active, use alternating current (ac). The method to calculate the line loss is based on the permitted electrical decibel loss (typically .5 dB) and can be calculated with the following equation:

Where:

$$R_L = \frac{V^2}{P} = \text{Load Resistance (W)}$$

V = Amplifier output voltage (V)
P = Power in Load (W)
R_W = Wire resistance

To solve for wire resistance:

Wire resistance (RW) is converted to wire length as follows:

$$D = \frac{R_W}{R_{/1000' \text{ pair}}} \times 1000$$

Where:
D = Distance in feet.
R_W = Maximum allowable wire resistance.
R/1000' pair = wire resistance per 1000'pair.

For a 0.5 dB loss calculation, the above equations may be simplified to:

$$\text{Max length} = \frac{59.25 \times \text{Amplifier output}^2}{\text{Wire resistance} \times \text{Circuit load}}$$

where:

- Amplifier output is the signal level in VRMS supplied by the amplifier driving the circuit
- Circuit load is the total watts required by the audio circuit
- Wire resistance is the resistance rating of the wire per 1000 ft pair, see Table 63 below.

For example, the maximum allowable wire length for an audio circuit consisting of a 30 W, 25 VRMS amplifier driving thirty 1-watt speakers, using 18-guage wire would be 95 ft.

$$94.95 = \frac{59.25 \times 25^2}{13 \times 30}$$

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ANAC Block Diagrams & Scenarios

The following images are of control equipment for an ANAC.

For **Figure F**, the notification appliances are connected to supervised NACs to an audio power amplifiers and control unit (CU). This may be an FACU or a remote audio power supply assembly.

Figure F – ANAC Power & Control Unit

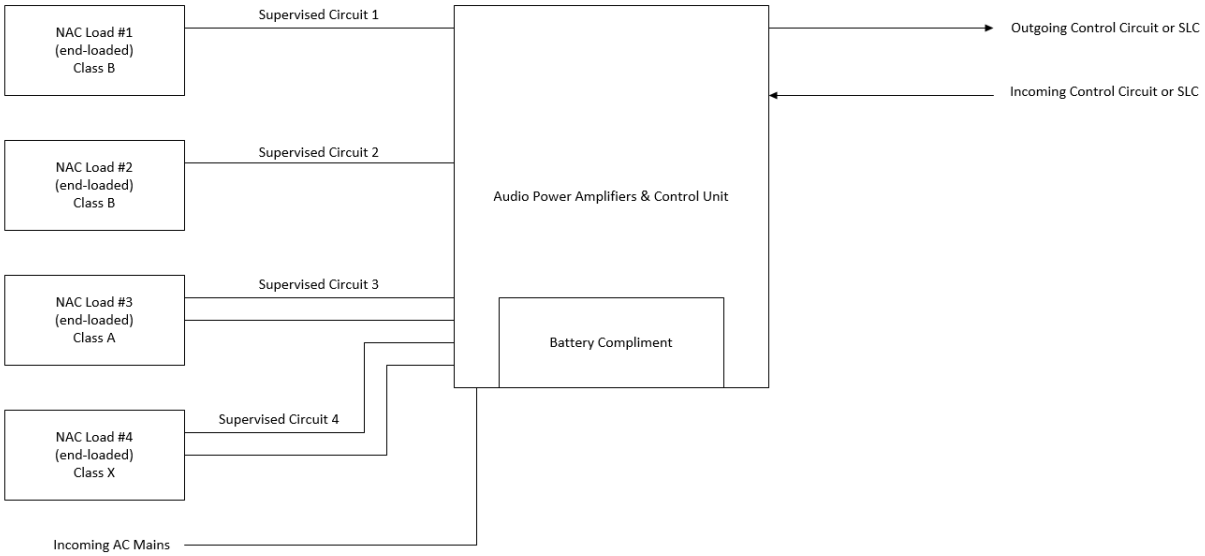
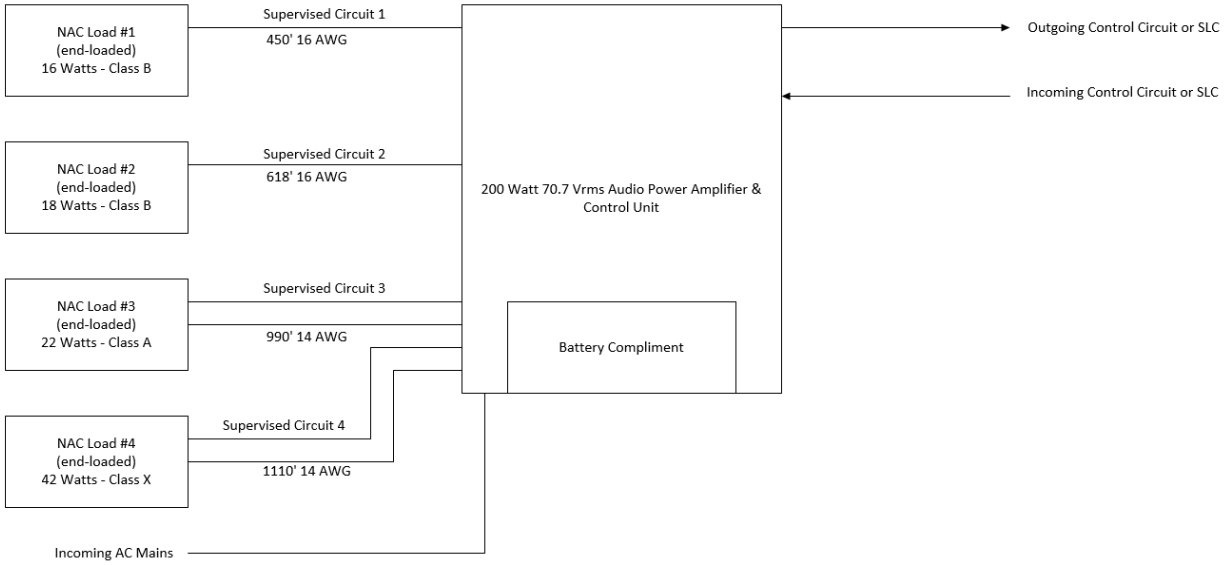


Figure G – Central System With Values



Circuit ID	Circuit Watts	Spare %	Calc Wattage	Wire Type	Length	Resistance	dB loss
1	16	20%	19.2	16 S	450	4.76	-0.1605
2	18	20%	21.6	16 S	618	6.54	-0.2468
3	22	20%	26.4	14 S	990	6.45	-0.2969
4	42	20%	50.4	14 S	1100	7.17	-0.6182

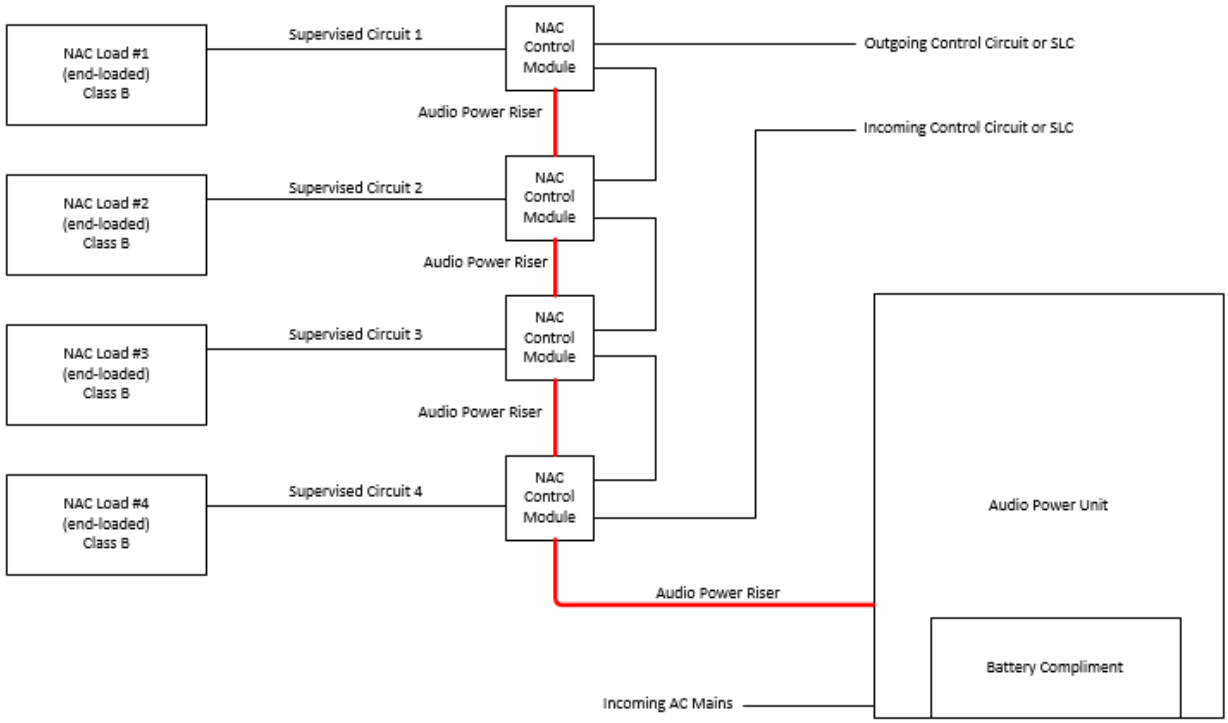
In the above example, Circuit 4 will have to be redesigned to get the loss to be under -0.5. A plausible approach may be to split the circuit into 2.

Scenario 4 – Common Riser To Control Modules

Figure H depicts an application where CMs are installed that are provided audio power as Riser Power. This application is typical for installations where CMs are installed near the load and are powered from remote audio power amplifiers. They may be away from the control/power unit and are supplied notification power via a common supervised power riser. In this case, all circuits that can be activated in the worst case all enter into the equation as the loading will impact the audio power riser voltage at each of the NAC Control Modules.

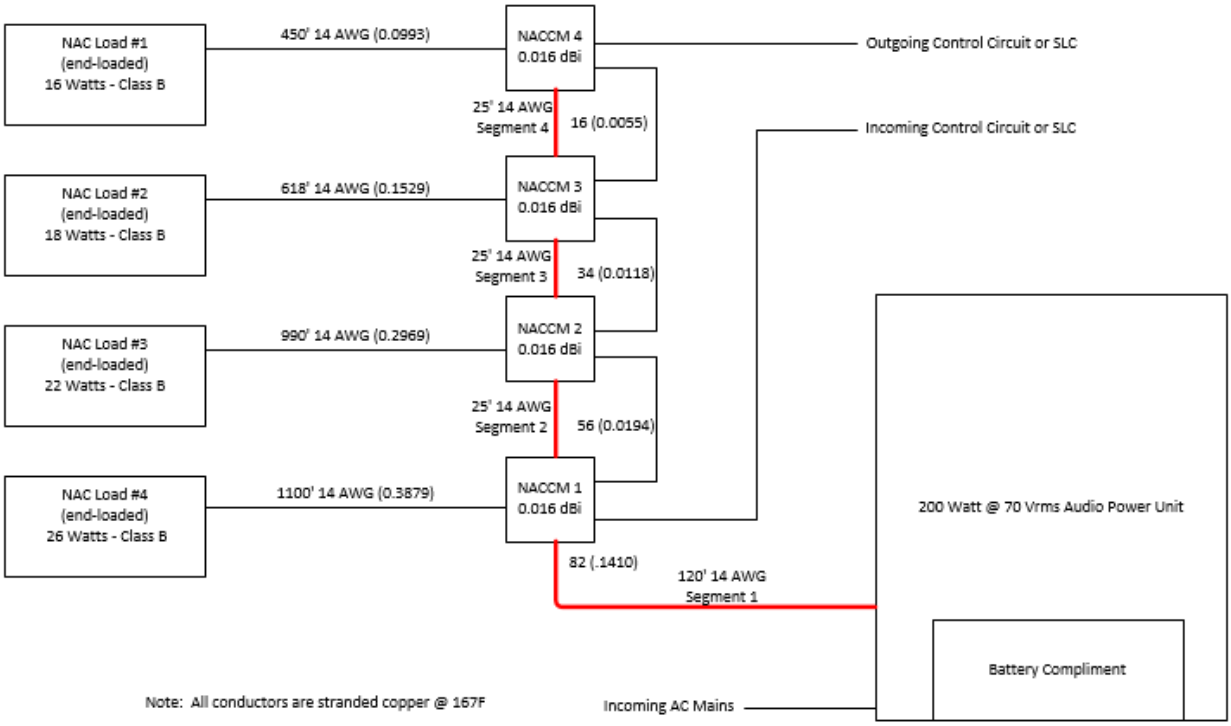
An example would be that a NAC Control Module is installed on each floor of a building to control the appliances on the respective floors and the NAC Control Modules are powered from a common audio power riser.

Figure H – ANAC CM With Power Riser



4. In the example above, each segment is calculated for dB loss, then the dB losses are added to the NAC Control Module dB insertion loss. This total provides the maximum dB loss that can be expected based on the system design.
5. For example, the below layout provides values for the configuration:

Figure I – ANAC CM With Values



Circuit	Line	NACCM	Segment 1	Segment 2	Segment 3	Segment 4	Riser total	Total dB Loss
1	0.0993	0.016	0.0055	0.0118	0.0194	0.1410	0.1777	0.293
2	0.1529	0.016	0	0.0118	0.0194	0.1410	0.1722	0.3411
3	0.2969	0.016	0	0	0.0194	0.1410	0.1604	0.4733
4	0.3879	0.016	0	0	0	0.1410	0.1410	0.5449

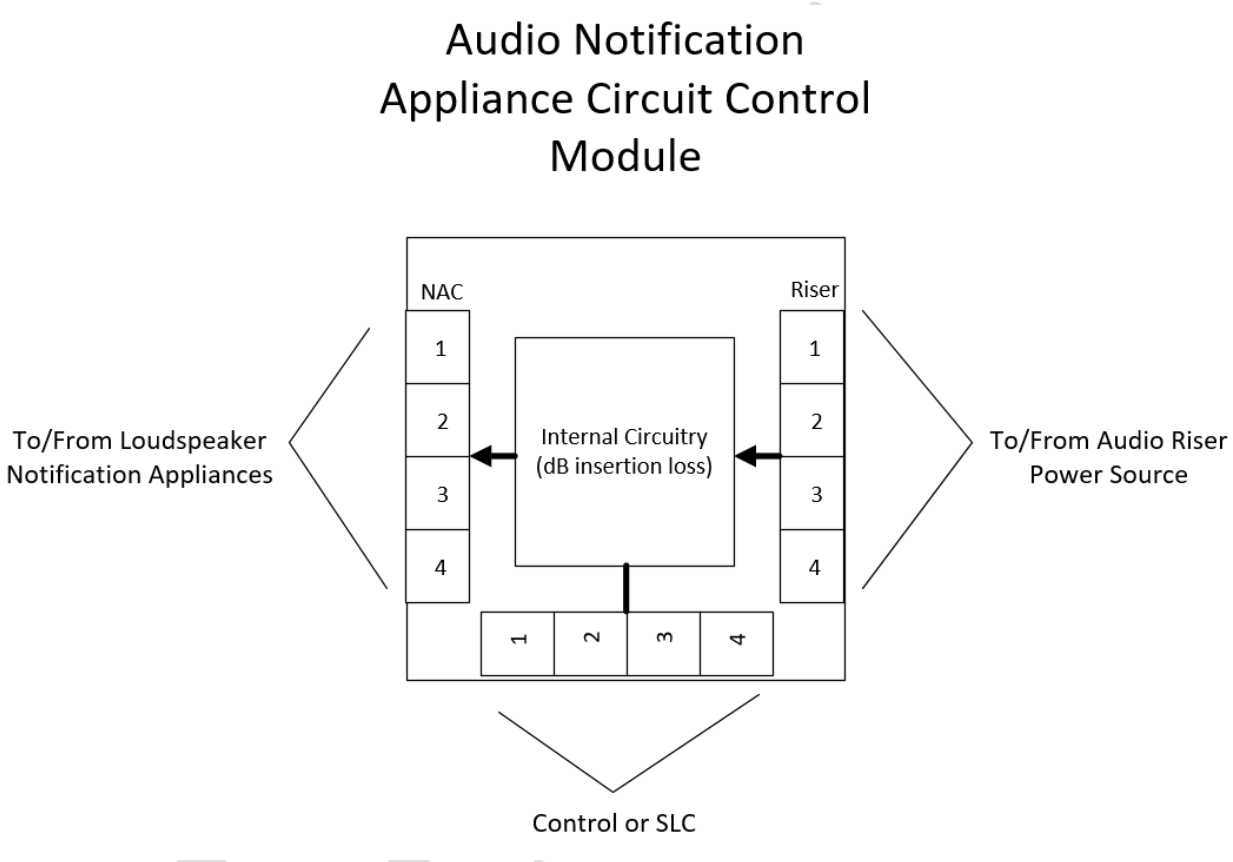
Each circuit section has to calculated, then they are added together. If the total dB Loss exceeds 0.5 dB, the circuit/system should be redesigned.

Based on the calculations above, the system will have to be redesigned to support all the circuits. In this example, if Segment 1 (Audio Power Unit to NACCM 1) was changed from 14 AWG stranded to 12 AWG stranded, the circuit will work.

Note that as you go up the circuit, each segment of the riser is added to create the riser total. For Circuit 4 in the above example, the only Segment that applies to the calculation is #4, but for Circuit (Load) 1, all 4 riser Segment are part of the circuit calculation.

6. **Figure J** provides a block diagram of the internal sections of the NACCM. The Internal Circuitry will impact the CMSTV and for ANACs, is expressed in dB insertion loss.

Figure J – ANAC CM Internal Block Diagram



For a Control Module on an ANAC, the dB insertion loss is added to the circuit total dB loss.

Next Steps

1. Task Group to review 2nd Draft PIs.
2. Task Group to meet to update documentation.
3. Add Terminal Voltage testing to NRTL Listing testing specifications via STP
4. Request manufacturers to voluntarily provide measured guidance until NRTL testing processes have been updated

DRAFT

Public Comment No. 303-NFPA 72-2020 [Section No. 18.4]

The Technical Committee is advised to review Public Input 252 for possible inclusion of the proposed signal for this technology.

18.4 Audible Characteristics.

18.4.1 General Requirements.

18.4.1.1*

An average ambient sound level greater than 105 dBA shall require the use of a visual notification appliance(s) in accordance with Section 18.5 where the application is public mode or Section 18.6 where the application is private mode.

18.4.1.2*

The total sound pressure level produced by combining the ambient sound pressure level with all audible notification appliances operating shall not exceed 110 dBA at the minimum hearing distance.

18.4.1.3*

Sound from normal or permanent sources, having a duration of at least 60 seconds, shall be included when measuring maximum ambient sound level.

18.4.1.4

Sound from temporary or abnormal sources lasting less than 60 seconds shall not be required to be included when measuring maximum ambient sound level.

18.4.1.5

Audible alert and evacuation signal tones, including those that precede or follow voice messages, shall meet the requirements of 18.4.4 (Public Mode Audible Requirements), 18.4.5 (Private Mode Audible Requirements), 18.4.6 (Sleeping Area Requirements), or 18.4.7 (Narrow Band Tone Signaling for Exceeding Masked Thresholds), as applicable.

18.4.1.5.1*

The designer of the audible notification system shall identify the rooms and spaces that will have audible notification and those where audible notification will not be provided.

18.4.1.5.2

Unless otherwise required by other sections of this Code, the coverage area for audible occupant notification shall be as required by other governing laws, codes, or standards.

18.4.1.5.3

Where other governing laws, codes, or standards require audible occupant notification for all or part of an area or space, coverage shall only be required in occupiable areas as defined in 3.3.195

18.4.1.5.4

The sound pressure levels that must be produced by the audible appliances in the coverage areas to meet the requirements of this Code shall be documented by the system designer during the planning and design of the notification system.

18.4.1.5.5

The greater of the expected average ambient sound pressure level or expected maximum sound pressure level having a duration of at least 60 seconds shall be documented for the coverage area by the system designer to ensure compliance with 18.4.4, 18.4.5, 18.4.6, or 18.4.7.

18.4.1.5.6

The design sound pressure levels to be produced by the notification appliances for the various coverage areas shall be documented for use during acceptance testing of the system.

18.4.1.5.7

Where required by the authority having jurisdiction, documentation of the design sound pressure levels for the various coverage areas shall be submitted for review and approval.

18.4.1.6*

Voice messages shall not be required to meet the audibility requirements of 18.4.4 (Public Mode Audible Requirements), 18.4.5 (Private Mode Audible Requirements), 18.4.6 (Sleeping Area Requirements), or 18.4.7 (Narrow Band Tone Signaling for Exceeding Masked Thresholds), but shall meet the intelligibility requirements of 18.4.11 where voice intelligibility is required.

18.4.1.7

Audible notification appliances used for exit marking shall not be required to meet the audibility requirements of 18.4.4 (Public Mode Audible Requirements), 18.4.5 (Private Mode Audible Requirements), 18.4.6 (Sleeping Area Requirements), or 18.4.7 (Narrow Band Tone Signaling for Exceeding Masked Thresholds), except as required by 18.4.8 (Exit Marking Audible Notification Appliance Requirements).

18.4.2 Distinctive Evacuation Signal.

18.4.2.1*

To meet the requirements of Section 10.11, the alarm audible signal pattern used to notify building occupants of the need to evacuate (i.e., leave the building) or relocate (i.e., from one area to another) shall be the standard alarm evacuation signal consisting of a three-pulse temporal pattern in accordance with ANSI/ASA S3.41, *Audible Emergency Evacuation (E2) And Evacuation Signals With Relocation Instructions (ESRI)*.

18.4.2.2*

The signal shall be repeated for a period appropriate for the purposes of evacuation of the building, but for not less than 180 seconds unless otherwise set forth in an emergency plan approved by the authority having jurisdiction.

18.4.2.3

The minimum repetition time shall be permitted to be automatically interrupted for the transmission of mass notification messages in accordance with Chapter 24.

18.4.2.4*

The standard evacuation signal shall be synchronized within a notification zone.

18.4.3 Distinctive Carbon Monoxide Audible Alarm Signal.

18.4.3.1

Where a carbon monoxide detector or alarm is required by other codes or standards or by the authority having jurisdiction and where an audible signal is required, a distinctive signal pattern shall be required that is different from a fire evacuation signal.

18.4.3.2

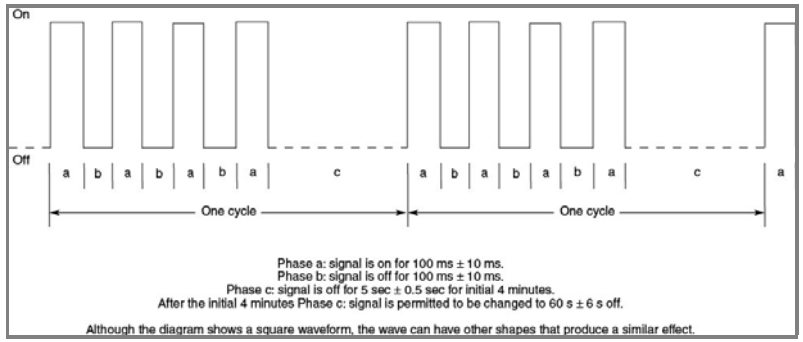
Where an audible signal is required, the carbon monoxide signal shall be a four-pulse temporal pattern and comply with the following:

(1) Signals shall be a pattern consisting of four cycles of 100 milliseconds ± 10 percent "on" and 100 milliseconds ± 10 percent "off," followed by 5 seconds ± 10 percent "off," as demonstrated in Figure 18.4.3.2.

(2) After the initial 4 minutes of the carbon monoxide signal, the 5-second "off" time shall be permitted to be changed to 60 seconds ± 10 percent.

(3) The alarm signal shall be repeated in compliance with 18.4.3.2(1) and 18.4.3.2(2) until the alarm resets or the alarm signal is manually silenced.

Figure 18.4.3.2 Temporal Pattern Parameters — Carbon Monoxide Signal.



18.4.3.3

The signal shall be synchronized within a notification zone of a protected premises.

18.4.4* Public Mode Audible Requirements.

18.4.4.1*

To ensure that audible public mode signals are clearly heard, unless otherwise permitted by 18.4.4.2 through 18.4.4.5, they shall have a sound level at least 15 dB above the average ambient sound level or 5 dB above the maximum sound level having a duration of at least 60 seconds, whichever is greater, measured 5 ft (1.5 m) above the floor in the area required to be served by the system using the A-weighted scale (dBA).

18.4.4.2

Where approved by the authority having jurisdiction or other governing codes or standards, the requirements for audible signaling shall be permitted to be reduced or eliminated when visual signaling is provided in accordance with Section 18.5.

18.4.4.3

Audible notification appliances installed in elevator cars shall be permitted to use the audibility criteria for private mode appliances detailed in 18.4.5.1.

18.4.4.4

If approved by the authority having jurisdiction, audible notification appliances installed in restrooms shall be permitted to use the audibility criteria for private mode appliances detailed in 18.4.5.1.

18.4.4.5

A signaling system arranged to stop or reduce ambient noise shall comply with 18.4.4.5.1 through 18.4.4.5.3.

18.4.4.5.1

A signaling system arranged to stop or reduce ambient noise shall produce a sound level at least 15 dB above the reduced average ambient sound level or 5 dB above the maximum sound level having a duration of at least 60 seconds after reduction of the ambient noise level, whichever is greater, measured 5 ft (1.5 m) above the floor in the area required to be served by the system using the A-weighted scale (dBA).

18.4.4.5.2

Visual notification appliances shall be installed in the affected areas in accordance with Sections 18.5 or 18.6.

18.4.4.5.3

Relays, circuits, or interfaces necessary to stop or reduce ambient noise shall meet the requirements of Chapters 10, 12, 21, and 23.

18.4.5 Private Mode Audible Requirements.

18.4.5.1*

To ensure that audible private mode signals are clearly heard, they shall have a sound level at least 10 dB above the average ambient sound level or 5 dB above the maximum sound level having a duration of at least 60 seconds, whichever is greater, measured 5 ft (1.5 m) above the floor in the area required to be served by the system using the A-weighted scale (dBA).

18.4.5.2*

Where approved by the authority having jurisdiction or other governing codes or standards, the requirements for audible signaling shall be permitted to be reduced or eliminated when visual signaling is provided in accordance with Section 18.5.

18.4.5.3

A system arranged to stop or reduce ambient noise shall comply with 18.4.5.3.1 through 18.4.5.3.3.

18.4.5.3.1

A system arranged to stop or reduce ambient noise shall be permitted to produce a sound level at least 10 dB above the reduced average ambient sound level or 5 dB above the maximum sound level having a duration of at least 60 seconds after reduction of the ambient noise level, whichever is greater, measured 5 ft (1.5 m) above the floor, using the A-weighted scale (dBA).

18.4.5.3.2

Visual notification appliances shall be installed in the affected areas in accordance with Sections 18.5 or 18.6.

18.4.5.3.3

Relays, circuits, or interfaces necessary to stop or reduce ambient noise shall meet the requirements of Chapters 10, 12, 21, and 23.

18.4.6 Sleeping Area Requirements.

18.4.6.1*

Where audible appliances are installed to provide signals for sleeping areas, they shall have a sound level of at least 15 dB above the average ambient sound level or 5 dB above the maximum sound level having a duration of at least 60 seconds or a sound level of at least 75 dBA, whichever is greater, measured at the pillow level in the area required to be served by the system using the A-weighted scale (dBA).

18.4.6.2

If any barrier, such as a door, curtain, or retractable partition, is located between the notification appliance and the pillow, the sound pressure level shall be measured with the barrier placed between the appliance and the pillow.

18.4.6.3*

Audible appliances provided for the sleeping areas to awaken occupants shall produce a low frequency alarm signal that complies with the following:

(1) The waveform shall have a fundamental frequency of 520 Hz ± 10 percent.

(2)* The notification equipment shall be listed for producing the low frequency waveform.

18.4.7* Narrow Band Tone Signaling for Exceeding Masked Thresholds.

18.4.7.1 Masked Threshold Allowance.

Audible tone signaling shall be permitted to comply with the masked threshold requirements in this subsection in lieu of the A-weighted signaling requirements in 18.4.4 and 18.4.5.

18.4.7.2* Calculation Method.

The effective masked threshold shall be calculated in accordance with ISO 7731, *Danger signals for public and work places — Auditory danger signals*.

18.4.7.3 Noise Data.

Noise data for calculating the effective masked threshold shall be the peak value of noise lasting 60 seconds or more for each octave or one-third octave band.

18.4.7.4 Documentation.

Analysis and design documentation shall be submitted to the authority having jurisdiction and shall contain the following information:

(1) Frequency data for the ambient noise, including the date, time, and location where measurements were taken for existing environments, or projected data for environments not yet constructed

(2) Frequency data of the audible notification appliance

(3) Calculations of the effective masked threshold for each set of noise data

(4) A statement of the sound pressure level that would be required by 18.4.4 or 18.4.5 if masked threshold signaling had not been done

18.4.7.5 Sound Pressure Level.

For masked threshold signaling, the audible signal tone shall meet the requirements of either 18.4.7.5.1 or 18.4.7.5.2 but not for the reproduction of prerecorded, synthesized, or live messages.

18.4.7.5.1

The sound pressure level of the audible tone signal shall exceed the masked threshold in one or more octave bands by at least 10 dB in the octave band under consideration.

18.4.7.5.2

The sound pressure level of the audible tone signal shall exceed the masked threshold in one or more one-third octave bands by at least 13 dB in the one-third octave band under consideration.

18.4.8 Exit Marking Audible Notification Appliance Requirements.

18.4.8.1*

Exit marking audible notification appliances shall meet or exceed the frequency and sound level settings and guidelines specified in the manufacturer's documented instructions.

18.4.8.2*

In addition to 18.4.8.1, as a minimum, to ensure that exit marking audible notification appliance signals are clearly heard and produce the desired directional effects for 50 ft (15.24 m) within an unobstructed egress path, they shall meet the audibility requirements of 18.4.7 in at least one one-third octave band or one octave band within the effective frequency ranges of the interaural time difference (ITD), interaural level or intensity difference (ILD or IID), and anatomical transfer function or head-related transfer function (ATF or HRTF) localization cues.

18.4.8.3

The exit marking audible notification appliance signal shall penetrate both the ambient noise and the fire alarm signal.

18.4.8.4

Where required by the authority having jurisdiction governing laws, codes, or standards; or other parts of this Code, exit marking audible notification appliances shall be installed in accordance with the manufacturer's published instructions.

18.4.8.5*

Where required by the authority having jurisdiction governing laws, codes, or standards; or other parts of this Code, exit marking audible notification shall be located at the entrance to all building exits and areas of refuge as defined by the applicable building or fire code.

18.4.8.6

Where exit marking audible notification appliances are utilized to mark areas of refuge, they shall provide an audible signal distinct from that used for other exits that do not have areas of refuge.

18.4.9 Location of Audible Notification Appliances for Building or Structure.

18.4.9.1

If ceiling heights allow, and unless otherwise permitted by 18.4.9.2 through 18.4.9.5, wall-mounted appliances shall have their tops above the finished floors at heights of not less than 90 in. (2.29 m) and below the finished ceilings at distances of not less than 6 in. (150 mm).

18.4.9.2

Ceiling-mounted or recessed appliances shall be permitted.

18.4.9.3

If combination audible/visual notification appliances are installed, the location of the installed appliance shall be determined by the requirements of 18.5.5.

18.4.9.4

Appliances that are an integral part of a smoke detector, carbon monoxide detector, smoke alarm, carbon monoxide alarm, or other initiating device shall be located in accordance with the requirements for that device.

18.4.9.5

Mounting heights other than required by 18.4.9.1 and 18.4.9.2 shall be permitted, provided that the sound pressure level requirements of 18.4.4 for public mode or 18.4.5 for private mode, or 18.4.6 for sleeping areas, based on the application, are met.

18.4.10 Location of Audible Notification Appliances for Wide-Area Signaling.

Audible notification appliances for wide-area signaling shall be installed in accordance with the requirements of the authority having jurisdiction, approved design documents, and the manufacturer’s installation instruction to achieve the required performance.

18.4.11* Voice Intelligibility.

Within the acoustically distinguishable spaces (ADS) where voice intelligibility is required, voice communications systems shall reproduce prerecorded, synthesized, or live (e.g., microphone, telephone handset, and radio) messages with voice intelligibility.

18.4.11.1*

ADSs shall be determined by the system designer during the planning and design of all emergency communications systems.

18.4.11.2

Each ADS shall be identified as requiring or not requiring voice intelligibility.

18.4.11.3*

Unless specifically required by other governing laws, codes, or standards, or by other parts of this Code, intelligibility shall not be required in all ADSs.

18.4.11.4*

Where required by the authority having jurisdiction governing laws, codes, or standards; or other parts of this Code, ADS assignments shall be submitted for review and approval.

18.4.11.5

Quantitative measurements shall not be required.

18.4.11.6

Quantitative measurements shall be permitted. *(See D.2.4.)*

Additional Proposed Changes

File Name	Description	Approved
CorrelatingNoteNo._33.pdf	NFPA 72 - CN No. 33	

Statement of Problem and Substantiation for Public Comment

NOTE: This Public Comment appeared as Correlating Committee Note No. 33 in the First Draft Report and is related to Public Input No. 252 and First Revision No.'s 5013 and 5018.

The Technical Committee is advised to review Public Input 252 for possible inclusion of the proposed signal for this technology.

Related Item

• CN No. 33 • PI No. 252 • FR No. 5013 • FR No. 5018

Submitter Information Verification

Submitter Full Name: CC on SIG-AAC
Organization: NFPA 72 Correlating Committee

Street Address:
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Submittal Date: Wed May 06 16:56:59 EDT 2020
Committee: SIG-NAS

Public Comment No. 300-NFPA 72-2020 [New Section after 18.4.1.7]

Restricted Audible Mode Operation

18.4.1.8 Restricted Audible Mode Operation (RAMO) Notification

18.4.1.8.1 Where maximum sound pressure levels are required for a protected space, this operation shall be referred to as Restricted Audible Mode Operation (RAMO).

18.4.1.8.2 RAMO areas shall be indicated on the project drawings.

18.4.1.8.3 RAMO shall be permitted to be used only where there is constant awake and mobile staff.

18.4.1.8.4 RAMO shall not be used in protected areas where people may be sleeping without constant awake mobile staff.

18.4.1.8.5 Where required by the AHJ, for fixed use applications, the RAMO system shall be designed, installed and maintained such that the sound pressure level produced by the RAMO notification appliances throughout the protected space shall be at least 5 dBA-fast and not more than 20 dBA-fast above the average ambient sound pressure level or the maximum sound pressure level having a duration of 60 seconds, whichever is greater, measured at 5 ft. (1.5 m) above the finished floor in the protected space. The minimum sound pressure level produced in the protected area by the RAMO system shall be 45 dBA-fast.

18.4.1.8.6 Where required by the AHJ, for non-fixed use applications, the RAMO system shall be designed, installed and maintained with automatic sound pressure level adjustment controls such that the sound pressure level produced by the RAMO notification appliances throughout the protected space shall be maintained at least 5 dBA-fast and not more than 20 dBA-fast above the average ambient sound pressure level or the maximum sound pressure level having a duration of 60 seconds, whichever is greater, measured at 5 ft. (1.5 m) above the finished floor in the protected space. The minimum sound pressure level produced in the protected area by the RAMO shall be 45 dBA-fast.

18.4.1.8.7 Audible notification appliances for RAMO shall be Listed for a minimum of 45 dBA-fast at 10' on axis.

18.4.1.8.8 RAMO audible appliances shall be permitted to start their output cycle at 50% of the final volume for the 1 st 1/3 of the output cycle. This operation shall be referred to as RMO Ramp-up.

18.4.1.8.8.1 RAMO Ramp-up shall not be permitted on live paging operation, where the system is capable of providing live paging.

18.4.1.8.8.2 RAMO audible output that utilizes RAMO Ramp-up shall be measured at the maximum tone output of the appliance.

18.4.1.8.9 RAMO areas shall be reviewed at least annually to determine if the occupancy has changed.

18.4.1.8.10 Visual notification appliances shall not be permitted to eliminate audible notification in the protected area.

A18.4.1.8.1 The purpose of this RAMO information is to provide guidance to designers, engineers, users and AHJs relative to applications where the maximum amplitude of general area audible notification appliances should be controlled so as to not cause undue health issues for facility occupants. This is different than Public or Private Mode audible notification as these two modes set the minimum SPL for the use, but do not address the maximum amplitudes. An example of one of these applications would be facilities for people with Autism. The Risk Assessment should address the use of RAMO.

There have been situations where the system notification appliances can frighten or cause undo panic of occupants, which can impede the orderly evacuation of the protected space. Cases such as small children or autistic people reacting to the “instant on and very loud” notification appliance activation are of concern. For these types of environments, preference should be given to utilize voice alarm systems that utilize RAMO Ramp-up for pre-recorded messages.

Statement of Problem and Substantiation for Public Comment

Results of System Amplitude Task Group

Related Item

• Public Input 9

Submitter Information Verification

Submitter Full Name: Morris Stoops
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Submittal Date: Wed May 06 16:33:50 EDT 2020
Committee: SIG-NAS

Public Comment No. 301-NFPA 72-2020 [New Section after 18.4.1.7]

Maximum Public Mode Audible Level

18.4.1.9 Maximum Public Mode Audible Levels

18.4.1.9.1 When the Risk Assessment determines it is warranted where design or actual testing indicates that the Public Mode audible notification SPL will/does exceed 45 dBA-fast above the average ambient sound pressure level or the maximum sound pressure level having a duration of 60 seconds, whichever is greater, measured at 5 ft. (1.5 m) above the finished floor in the protected space, the AHJ shall have the authority to require that the audible notification SPL output be lowered to a maximum of 45 dBA-fast above the average ambient sound pressure level or the maximum sound pressure level having a duration of 60 seconds, whichever is greater, measured at 5 ft. (1.5 m) above the finished floor in the protected space.

18.4.1.9.1.1 Where the Public Mode SPL of a protected space has been reduced, said reductions shall be recorded in system documentation.

18.4.1.9.1.2 For areas where the Public Mode SPL has been reduced, each application shall be reviewed annually to determine if the application has changed.

A14.4.1.9.1 The purposed of this code section is to provide a method for AHJs to require that the amplitude of a system be adjusted so as not to exacerbate a situation. The Risk Assessment should address these applications, the changes should be documented and all the applications reviewed regularly for changes that may require system modifications.

Statement of Problem and Substantiation for Public Comment

System Maximum Audible Mode Operation

Related Item

• Public Input 9

Submitter Information Verification

Submitter Full Name: Morris Stoops
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Submittal Date: Wed May 06 16:37:02 EDT 2020
Committee: SIG-NAS

Public Comment No. 248-NFPA 72-2020 [Section No. 18.4.2.1]

18.4.2.1*

To meet the requirements of Section 10.11, the alarm audible signal pattern used to notify building ~~occupants of the need to evacuate (i.e., leave the building) or relocate (i.e., from one area to another) shall~~ occupants shall be the standard alarm evacuation signal consisting of a three-pulse temporal pattern in accordance with ANSI/ASA S3.41, *Audible Emergency Evacuation (E2) And Evacuation Signals With Relocation Instructions (ESRI)*.

Statement of Problem and Substantiation for Public Comment

Eliminates additional words that can be confusing and not needed for the requirement.

Related Item

• PI-167

Submitter Information Verification

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Submittal Date: Wed May 06 11:15:55 EDT 2020
Committee: SIG-NAS

Public Comment No. 59-NFPA 72-2020 [Section No. 18.4.2.1]

18.4.2.1*

To meet the requirements of Section 10.11, the alarm audible signal pattern used to notify building occupants of the need to evacuate (i.e., leave the building) ~~or~~ shall be the standard alarm evacuation signal consisting of a three-pulse temporal pattern in accordance with ANSI/ASA S3.41, *Audible Emergency Evacuation (E2)*

18.4.2.1.1 When approved by the authority having jurisdiction, the alarm audible signal pattern to notify building occupants of the need to relocate (i.e. ~~,~~ from one area to another within the building) shall be permitted to be one of the following:

a) the standard alarm evacuation signal consisting of a three-pulse temporal pattern in accordance with ANSI/ASA S3.41, *Audible Emergency Evacuation (E2) And Evacuation Signals With Relocation Instructions (ESRI)*

b)1-second to 3-second alert tone followed by a message in accordance with Section 24 . 4.8.3.

Statement of Problem and Substantiation for Public Comment

1. The committee statement for FR 5013 States: "These changes are intended to return the text to the version following the 2019 edition 1st draft. The final 2019 edition does not reflect the 1st draft changes. Those changes were unchanged in the 2nd draft. However, a floor CAM was passed but failed final Standards Council (SC) approval. When that occurs, the text does not stay as approved by the Technical Committee (TC). Instead, the directive is to ignore 1st and 2nd drafts and CAMs and to revert the text to the previous edition. Thus, the 2019 edition was returned to 2016 text, undoing the 1st draft changes"

Based on this statement that "the 2019 edition was returned to the 2016 text, undoing the 1st draft changes" - NEW Code language should not have been allowed to amend the code. However the FIRST DRAFT language for section 18.4.2.1 DID NOT return to the 2016 Language as stated by the TC: The following First Draft text is not included in the 2016 text of Section 18.4.2.1: "in accordance with ANSI/ASA S3.41, Audible Emergency Evacuation (E2) AND Evacuation Signals With Relocation Instructions (ESRI)" - This is against the committee statement and against NFPA procedure which required to return the CODE to the previous agreed 2016 language. I would like to request that NFPA staff will look into this issue and verify if all NFPA rules and procedures were followed regarding FR 5013 and the resulting FD language in order to prevent future appeals on this procedure.

2.While I understand that there is an ANSI standard for ESRI (which was newly added to this section - not sure if per the correct NFPA procedure) - This ANSI standard should not be mandatory for all the Fire Jurisdictions who are enforcing NFPA 72 and make them to ONLY require Temp-3 signal for Relocation purposes.

As it was clear to the majority of NFPA members (at the Tech Session via a large majority vote supporting CAM 72-1) and as it is clear to many AHJs per NFPA 72 definitions and other code sections - Evacuation and Relocation are two DIFFERENT procedures. Evacuation means to leave the building (to the outside) and Relocation means to change location within the building. NFPA 72 (definitions and chapter 24) treats RELOCATION as an emergency procedure within the building which is NOT an evacuation, and therefore, the purpose of the alert tone is to alert the building occupants that an emergency voice message is to follow and they should act according to the message. (similar non-evacuation emergency messages could be a "shelter-in-place message, etc.)

NFPA 72 clearly indicates: "A.3.3.100 Evacuation. Evacuation does not include the relocation of occupants within a building."

I understand that some people think that leaving the building to the outside or relocating from one area to another area within the building is the same concept and therefore they want to mandate the T-3 signal for both procedures. However, in my opinion and the majority of NFPA members' opinion at the Tech Session, it seemed as a big stretch to treat RELOCATION within the building same as "EVACUATION" to the outside of the building.

In my opinion, the TC needs to also consider what the general public thinks (based on the Tech Session vote for CAM 72-1) and to also to allow for some permissive language within the code to allow for different fire jurisdictions to enforce this requirement differently if they believe that different alert tones should be provided for Evacuation and Relocation procedures.

My amended Public Comment proposal is trying to ensure that AHJs will have the flexibility within the code to either enforce the T-3 signal for both evacuation and relocation procedures OR they could enforce a 1-3 Second alert tone for Relocation per Section 24.4.8.3, which treats Relocation Messages as "NON-Evacuation" messages:

"24.4.8.3 Where the system is used to transmit relocation instructions or other fire emergency non-evacuation messages, a 1-second to 3-second alert tone followed by a message (or messages where multi-channel capability is used) shall be provided."

If the TC will keep insisting on requiring ONLY T-3 for both procedures, this will be against the NFPA membership majority's opinion and against many AHJs procedures and this code will keep to not be in consensus and will trigger future NITMAMs and appeals, etc. I encourage the TC to resolve this issue based on this Public Comment.

As a reference: This proposal has passed the Tech-Session CAM 72-1 with a large majority (262-176 Pass) to accept Public comments 386 and 387. Based on the Tech-Session debate (see available script on the NFPA 72 online page) it was clear to most NFPA members that "Evacuation Signal" means to alert occupants to "Leave the building", While "Relocation signal" means to alert occupants to move from one area to another area within the building. The definition for "Relocation" in section 3.3.242 clearly states this intent:

"3.3.242 Relocation. The directed movement of occupants from one area to another area within the same building"

The definition for "Evacuation" is:

"3.3.100* Evacuation. The withdrawal of occupants from a building. (SIG-PRO)"

It is specifically explained in the Annex as:
"A.3.3.100 Evacuation. Evacuation does not include the relocation of occupants within a building."

Also, the definition of an Evacuation Signal is:

"3.3.263.4 Evacuation Signal. A distinctive alarm signal intended to be recognized by the occupants as requiring evacuation of the building. (SIG-PRO)"

Therefore it is clear that an Evacuation Signal COULD Be different than a Relocation signal.

Related Item

• PI 167 • FR 5013 • CAM 72-1

Submitter Information Verification

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Submittal Date:	Sun Mar 29 12:46:05 EDT 2020
Committee:	SIG-NAS

Public Comment No. 305-NFPA 72-2020 [Section No. 18.4.2.2]

The Technical Committee is advised to review the usage of the phrase "appropriate for the purposes" in 18.4.2.2 for enforceability, per the Manual of Style.

18.4.2.2 *

The signal shall be repeated for a period appropriate for the purposes of evacuation of the building, but for not less than 180 seconds unless otherwise set forth in an emergency plan approved by the authority having jurisdiction.

Additional Proposed Changes

File Name	Description	Approved
CorrelatingNoteNo._34.pdf	NFPA 72 - CN No. 34	

Statement of Problem and Substantiation for Public Comment

NOTE: This Public Comment appeared as Correlating Committee Note No. 34 in the First Draft Report and is related to First Revision No. 5013.

The Technical Committee is advised to review the usage of the phrase "appropriate for the purposes" in 18.4.2.2 for enforceability, per the Manual of Style.

Related Item

• CN No. 34 • FR No. 5013

Submitter Information Verification

Submitter Full Name: CC on SIG-AAC
Organization: NFPA 72 Correlating Committee
Street Address:
City:
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Submittal Date: Wed May 06 17:03:42 EDT 2020
Committee: SIG-NAS

Public Comment No. 60-NFPA 72-2020 [Section No. 18.4.2.2]

18.4.2.2*

The signal shall be repeated ~~for a period appropriate for the purposes of evacuation of the building, but for~~ until the fire alarm system is manually silenced or reset by emergency or authorized personnel, or when approved by the authority having jurisdiction based on an emergency plan, the signal shall be permitted to automatically silenced, but not less than 180 seconds ~~unless otherwise set forth in an emergency plan approved by the authority having jurisdiction.~~ after the signal was initiated.

Statement of Problem and Substantiation for Public Comment

This Section was amended per FR-5013, and the language in the proposed First Draft is NEW and is different than the previous language in NFPA 72 - 2016

The committee statement for FR-5013 indicates:

"These changes are intended to return the text to the version following the 2019 edition 1st draft. The final 2019 edition does not reflect the 1st draft changes. Those changes were unchanged in the 2nd draft. However, a floor CAM was passed but failed final Standards Council (SC) approval. When that occurs, the text does not stay as approved by the Technical Committee (TC). Instead, the directive is to ignore 1st and 2nd drafts and CAMs and to revert the text to the previous edition. Thus, the 2019 edition was returned to 2016 text, undoing the 1st draft changes."

1) Since the proposed First Draft language is different than the language in Section 18.4.2.3 of NFPA 72-2016 - I would like to request that an NFPA staff will look into the NFPA rules and procedures as mentioned in the Committee Statement for FR 5031 and verify why the language was not returned to the previous consensus language of the 2016 Edition. This request is to ensure that all NFPA procedures are followed based on the committee statement and to prevent future associated appeals on the process.

2) As it was explained to the NFPA members during the Tech Session discussion for CAM 72-2, which was won by an overwhelming majority of 396-42, there are two major problems with the proposed First Draft language:

First Problem:

The First Draft language includes the term: "for a period appropriate for the purposes of evacuation of the building" - As it was clear to most of the NFPA members attending the Tech Session (396 Vs. 42 majority) and to many Fire AHJs, this language is NOT enforceable, is confusing and could create major inconsistencies between different jurisdictions and different facilities. No-one can reliably determine what is an "appropriate" period for evacuation since every emergency has unknown factors, etc. This unclear and unenforceable code language puts AHJs in dilemmas and therefore, it should be avoided from being the code default language.

Second Problem:

NFPA 72 should have the SAFETY concern as its main concern and SAFETY should always have priority over convenience.

Therefore, the CODE should have the SAFEST option as the required DEFAULT and may allow other (Less Safe) options on a performance basis for

convenience and other reasons, and not the other way around as the First Draft language proposes.

It was clear to most NFPA members (396-42 majority at the Tech Session) and to many other Fire AHJs, that the Safest option for the signal repetition is to require Emergency or Authorized personnel (see the new NEW definitions for these Terms) to manually shut down the audible signal after they physically assess the emergency situation and its associated evacuation process and determine that it is safe to shut it down.

However, it is acknowledged that for some facilities (for convenience and not necessarily Safety reasons), AHJs may allow to use an Automatic cut-off time of the audible signal programmed into the FACU, based on a specific approved emergency plan for a specific facility. But this performance option should not be the CODE default for all AHJs and All facilities, since it is less safe than the manual shut down by emergency/authorized personnel.

Related Item

• PI 168 • FR 5013 • CAM 72-1

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Submittal Date: Sun Mar 29 15:31:55 EDT 2020
Committee: SIG-NAS

Public Comment No. 69-NFPA 72-2020 [Section No. 18.4.4.3]

18.4.4.3

Audible notification appliances installed in elevator cars shall ~~be permitted to use the audibility criteria for private mode appliances detailed in 18~~ comply with 24 .4. 8. 5 ~~.1.~~

Statement of Problem and Substantiation for Public Comment

The original proposal in PI-195 to delete this section was rejected by the TC with the following statement: "This provision allows a slightly reduced sound pressure level where appliances are installed in elevator cars. It does not require appliances to be installed."

However, the committee did not address the problem of the reference to 18.4.5.1 (Private Mode)

While it is understood that this section "does not require appliances to be installed" inside elevator cars, there is still a problem with this section reference to 18.4.5.1 since no other code or standard requires private mode appliances in elevator cars.
The only FA system audible appliances that are sometimes installed inside elevator cars are FA speakers, where an EVACS is provided for the building and the elevator cars speakers are used for manual paging only.

If the TC is aware of any other code or any other scenario where private mode FA audible appliances (NOT Speakers) are installed inside elevator cars for FA signaling, please state so. However, If no such code or scenario could be found, this section must be amended to avoid conflicts with 24.4.8.5 and by indicating compliance with Private Mode where no private mode appliances are ever provided inside elevator cars. (FA speakers used for manual paging only are not Private Mode appliances per 18.4.5.1)

This proposed revised Public Comment resolves the issue by recognizing the fact that FA audible appliances may be required/installed inside elevator cars and if they do, they should be in compliance with Section 24.4.8.5

This will eliminate the conflict with 24.4.8.5 and resolve the issue with the reference to 18.4.5.1 (private mode)

24.4.8.5 Where provided, loudspeakers in each enclosed stairway, each exit passageway, each occupant evacuation elevator lobby, and each group of elevator cars within a common hoistway or bank shall be connected to separate notification zones for manual paging only.
24.4.8.5.1 The evacuation signal specified in 18.4.2 shall not operate in elevator cars, exit stair enclosures, and exit passageways.
24.4.8.5.2 Manually activated loudspeakers shall be permitted in exit stair enclosures, exit passageways, and elevators in buildings that have emergency voice/alarm communications systems in accordance with Section 24.4.

Related Item

• PI 195

Submitter Information Verification

Submitter Full Name: Sagiv Weiss-Ishai
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Submittal Date: Sat Apr 11 14:04:28 EDT 2020
Committee: SIG-NAS

Public Comment No. 70-NFPA 72-2020 [Section No. 18.4.4.5.3]

*** 18.4.4.5.3**

Relays, circuits, or interfaces necessary to stop or reduce ambient noise shall meet the requirements of Chapters 10, 12, 21, and 23.

Add Annex to this Section:

A18.4.4.5.3: In facilities where an amplified sound system is used for music and other voice amplification, such as live performances in theaters, auditoriums, etc. and there are FA audible appliances installed at the same area of the facility, a FA control relay or interface should be provided to automatically shut down the amplified music and/or voice system upon activation of the FA audible signal. This automatic shut down of the non-emergency sound system should be performed in order to allow for the emergency FA system signal to sound and be audible to the occupants of the facility.

Statement of Problem and Substantiation for Public Comment

The problem with the current section is that it references "ambient noise only" and there is no specific indication for amplified sound systems for music and other voice sound systems.
Currently, Fire AHJs need to interpret this section related to amplified music or other sound systems as "ambient noise" and some AHJs are not aware that in facilities with amplified sound systems such as theaters, clubs, auditoriums, where FA system audible appliances are installed they should require that a FA relay/interface should be provided to automatically shut down the amplified sound system and to allow the FA audible signal to be heard by the occupants of the facility.

This amended Public Comments does not propose to change the code. It is just proposing to provide some more guidance to AHJs enforcing FA systems in facilities with amplified music/voice sound systems.

Related Item

• PI 247 • PI 196

Submitter Information Verification

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Committee: SIG-NAS

Public Comment No. 296-NFPA 72-2020 [Section No. 18.4.6.1]

18.4.6.1*

18.4.6.1* _ Where audible notification appliances are installed to provide signals for designated sleeping areas, they shall be Listed for low-frequency output and have a sound level of at least 15 dB above the average ambient sound level or 5 dB above the maximum sound level having a duration of at least

~~60 seconds~~
60 seconds or a sound level of at least 75 dBA -fast , whichever is greater, measured at the

~~pillow level~~
point where the human head is normally expected to be at in the

~~area required to be served by the system using the A-weighted scale (dBA).~~
protected area. Any area that is intended to be used for sleeping shall be designated on the plans and in site system documentation.

A18.4.6.1 Listed low-frequency audible notification appliances have been required for sleeping areas in previous versions of the Code. These areas have typically been defined as sleeping areas only if they had fixed beds in them. What has been experienced since that implementation is that there are other areas where people typically can and do fall asleep. These areas also should be evaluated to determine if they should be provided with low-frequency audible notification appliances. Some of these areas are:

- Areas and rooms with “Murphy” beds
- Common spaces within dwelling units, such as living rooms, dens, etc. (with couches, beds, etc.).
- Doctor’s/Staff sleeping rooms
- Nap rooms or areas

Sleeping areas that are provided with constant awake staff are not required to be provided with low-frequency audible notification appliances.

Designated sleeping areas should be reviewed at least annually to determine if the use of the area has changed.

Statement of Problem and Substantiation for Public Comment

These updates are the result of the Sleeping Area Notification Task Group

Related Item

• relates to PI 9

Submitter Information Verification

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Submittal Date: Wed May 06 16:09:19 EDT 2020
Committee: SIG-NAS

Public Comment No. 190-NFPA 72-2020 [New Section after 18.5.5.4]

TITLE OF NEW CONTENT

18.5.5.5 The minimum height of a visual notification appliance listed for ceiling mounting shall be 80 in. (2.03 m) or the actual ceiling height, whichever is less.

Type your content here ...

Statement of Problem and Substantiation for Public Comment

Add new 18.5.5.4 as noted in 18.5.5.5 as suggested in Committee Input No. 5024 to establish a minimum height for ceiling listed appliances.

Related Item

• Committee Input No. 5024-NFPA 72-2019 [Section No. 18.5.5.4]

Submitter Information Verification

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Submittal Date: Tue May 05 12:30:26 EDT 2020
Committee: SIG-NAS

Public Comment No. 191-NFPA 72-2020 [Section No. 18.5.5.5]

18.5.5.5* Obstructions.

~~18.5.5.5.1~~ –

~~Ceiling mount visual notification appliances shall be mounted such that the effect of the appliance is not blocked by obstructions.~~

~~18.5.5.5.~~ 2

The effect of obstructions on the distribution of light ~~from wall-mounted~~ to surrounding surfaces from visual appliances shall be considered when determining the location of appliances.

18.5.5.5.3

The effect of obstructions on the direct viewing of corridor appliances shall be considered when determining the location of appliances.

Statement of Problem and Substantiation for Public Comment

The changes made in the first draft use different language for ceiling vs wall mounted appliances. The language for ceiling appliances is particularly challenging as it raises significant enforcement issues. What is "blocked"? Totally? Partially? The changes propsed in this comment make the text generic.

Related Item

• First Revision No. 5084-NFPA 72-2019 [New Section after 18.5.5.4]

Submitter Information Verification

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Submittal Date: Tue May 05 12:37:51 EDT 2020
Committee: SIG-NAS

Public Comment No. 306-NFPA 72-2020 [Section No. 18.10.2]

The Technical Committee is advised to verify the correct UL reference standard for tactile appliances.

18.10.2* Performance.

Tactile appliances shall meet the performance requirements of UL 1971, *Signaling Devices for the Hearing Impaired*, or equivalent.

Additional Proposed Changes

File Name	Description	Approved
CorrelatingNoteNo._35.pdf	NFPA 72 - CN no. 35	

Statement of Problem and Substantiation for Public Comment

NOTE: This Public Comment appeared as Correlating Committee Note No. 35 in the First Draft Report.

The Technical Committee is advised to verify the correct UL reference standard for tactile appliances.

Related Item

• CN No. 35

Submitter Information Verification

Submitter Full Name: CC on SIG-AAC
Organization: NFPA 72 Correlating Committee
Street Address:
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Submittal Date: Wed May 06 17:13:46 EDT 2020
Committee: SIG-NAS

Public Comment No. 192-NFPA 72-2020 [Section No. A.18.5.5.5]

A.18.5.5.5

Obstructions to consider include, but are not limited to, light fixtures, duct work, structural elements, and video monitors. In corridors, it is the viewing of the appliance which is of concern. In rooms, it is the pattern of light produced on walls and floors that might be of concern. For corridor application, see the requirements of 18.5.5.7.6.

Statement of Problem and Substantiation for Public Comment

This added text points to another relevant section.

Related Item

• First Revision No. 5084-NFPA 72-2019 [New Section after 18.5.5.4]

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Committee: SIG-NAS

Public Comment No. 350-NFPA 72-2020 [Section No. D.5.2.3.5]

The Technical Committee is advised to consider whether Fire Command Center should be included Emergency Command Center.

D.5.2.3.5

An emergency command center or fire command center will not be free of noise during an actual emergency. However, for testing purposes, the room should be relatively free of extraneous noises that could affect the results. The purpose of the tests is to establish the baseline capability of the system and acoustic environment to support intelligible communications. Good design practice for an emergency command center is to isolate the space so that only emergency command personnel have access. In addition, the location of the microphone for manual input should be such that background discussions and noise are minimized.

Additional Proposed Changes

File Name	Description	Approved
CorrelatingNoteNo._71.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: This Public Comment appeared as Correlating Committee 71 in the First Draft Report.

The Technical Committee is advised to consider whether Fire Command Center should be included Emergency Command Center.

Related Item

• CN No. 71

Submitter Information Verification

Submitter Full Name: CC on SIG-AAC
Organization: NFPA 72 Correlating Committee
Street Address:
City:
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Zip:
Submittal Date: Fri May 08 11:36:49 EDT 2020
Committee: SIG-NAS