



Public Comment No. 244-NFPA 72-2023 [Section No. 18.3.7.1]

Updates to PI 542:

18.3.7 * Notification Appliance Circuits

18.3.7.1

* _

~~A notification appliance circuit shall comply with Chapter 12 -~~

Direct Current Notification Appliance Circuits (DCNACs) shall be designed and installed as follows:

18.3.7.1.1 DCNAC starting voltages shall be based on:

- a) The Control Unit Start Terminal Voltage (CUSTV) of the power source and the current at the minimum input voltage rating of the appliances for circuits that are integrated directly into the Control Unit, and
- b) The Control Module Start Terminal Voltage (CMSTV) of the Control Module (CM) at the minimum input voltage rating of the appliances for circuits that are connected to a CM.

18.3.7.1.2* NACs that use CMs that are not integrated directly with the Control Unit(s) assemblies shall be accounted for in circuit designs.

18.3.7.1.2.1* Module Voltage Adjustment (MVA) for DCNAC CMs, when used, shall be factored into each circuit.

18.3.7.1.2.2* CMs are permitted to be dually rated for MVA and Module Insertion Loss (MIL) when the modules are designed and Listed for DC (DCNAC) and Audio NAC (ACNAC) use.

18.3.7.1.3 All wiring for 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).

18.3.7.1.4 NACs shall be designed based on one of the following:

18.3.7.1.4.1 End-Line-Loaded (ELL), where all the load is calculated to be at the end of the circuit.

18.3.7.1.4.2 Point-To-Point (PTP), where the load is distributed between different points on the circuit and each segment is accounted for in the overall circuit calculation.

A18.3.7

Notification Appliances. The goal of a properly designed and installed system is to ensure that the notification appliances will operate at the required output (sound pressure level, candela output, synchronization, etc.) and durations for 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 DCNACs the appliance nameplate (Listed) voltage and current consumption values are used. This will typically be X mA @ 16 VDC (for a 24 VDC appliance) where X is the actual Listed/Certified current draw of the appliance.

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 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.

A18.3.7.1.2

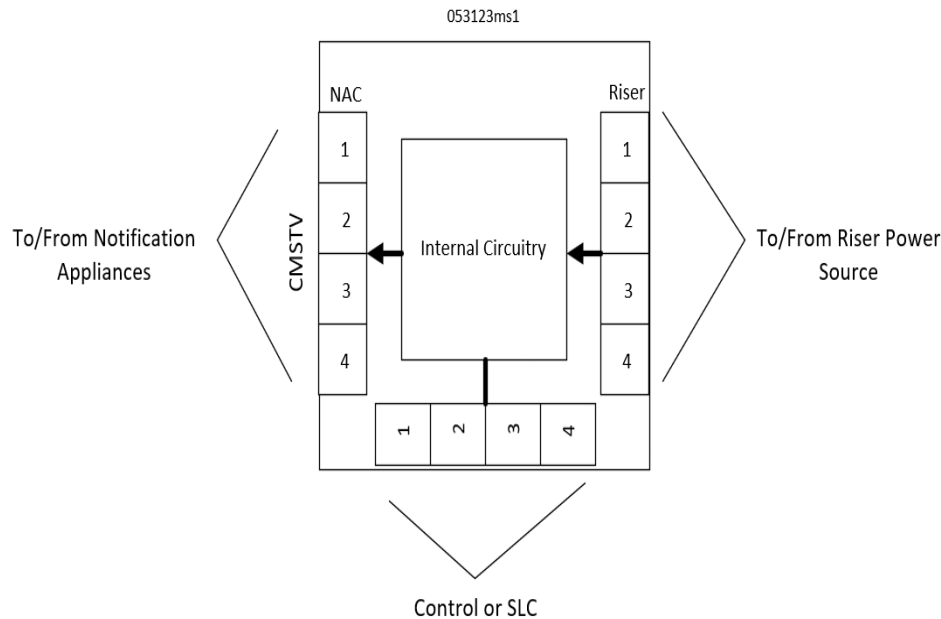
Control Modules. These typically field-installed (not integrated directly into Control Units) addressable control modules (CM) provide electrical supervision of the DCNAC and/or may provide some control of the power riser coming into the CM. Any module or device that is in the power riser electrical path or that may impact the performance of the riser must be accounted for in the system design, installation and testing. Other examples of CMs may be, but are not limited to:

- Relays
- Coders
- Supervision
- Synchronization

A18.3.7.1.2.1

- (1) **Figure E** provides a block diagram of the internal sections of a typical DCNAC CM. The DCNAC CM may impact the voltage of the connected NAC. This is typically a voltage drop. Some may boost the voltage. In either case, in DCNACs, this is referred to as Module Voltage Adjustment (MVA) and must be accounted for in the overall system design.
- (1) Figure E – NAC CM Internal Block Diagram

Notification Appliance Circuit Control Module (CM)



For a CM on a DCNAC, the following is the formula for the unit:

$$\text{CMSTV} = \text{Riser Terminal} -/+ \text{Internal Circuitry}$$

Control Module Start Terminal Voltage (CMSTV)

Example with Values:

$$17.41446 = 18.11446 - 0.7$$

In the above example:

- (1) The incoming CM Power Riser provides 18.11446 VDC.
- (2) The MVA is 0.7 VDC
- (3) The CMSTV is 17.41446
- (4) The NAC that is being controlled by this CM could tolerate up to a 1.41446 voltage drop on the circuit. This is calculated by:
 - (5) CSMTV of 17.41446
 - (6) Notification Appliance low voltage rating of 16
 - (7) 1.41446 = 17.41446 - 16

A18.3.7.1.4

Voltage Drop Calculations: This is the key design factor. There are two acceptable methods. They are:

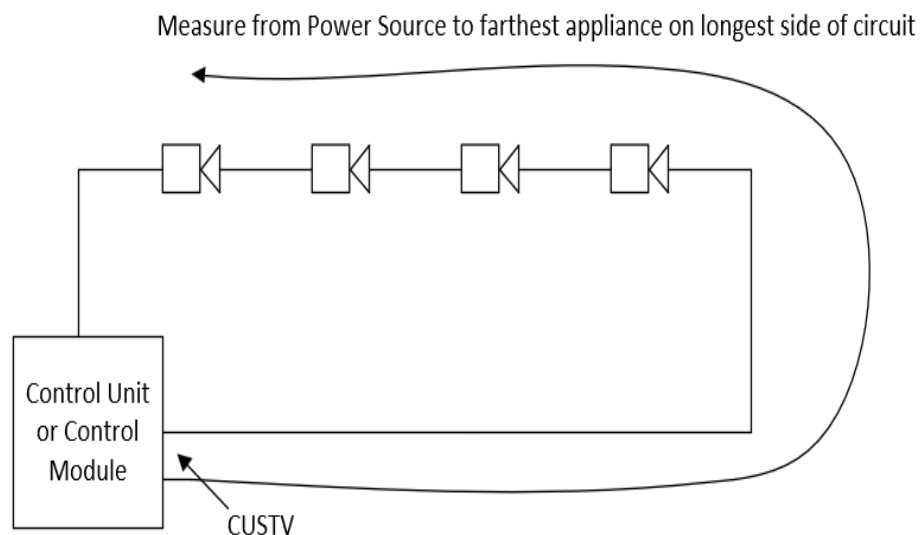
- End Line Loading - (ELL) this assumes that all the appliances are at the end of the circuit and are activated at one time. This is the most conservative method and is the recommended design method for all systems.

- 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 based on the individual segment and tested on total resistance and loss.

The following diagram depicts how to measure the circuit length for a Class A NAC:

Class A Measurement For Circuit Length

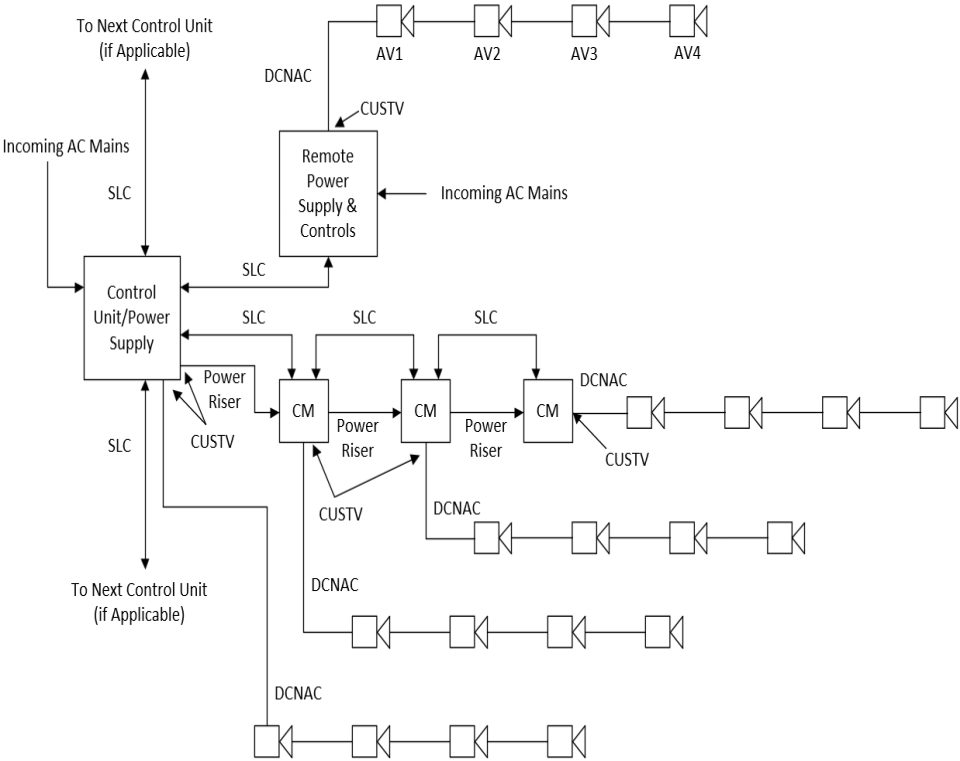
053123ms1



The following diagram depicts the overall power flow and areas of concern for a system:

DC NACS End-To-End Concept Diagram

053123ms1



Note – if the power riser is altered by the CM as the power comes in/out of the CM, that adjustment also needs to be included in the calculations.

A18.3.7.1.2.2 MIL stands for Module Insertion Loss, which is covered in Chapter 24, but is referenced here to provide overall continuity of system design.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
SIGNAS_DCNACS_updated_PI_053123ms1.docx	Complete updated file to revise 18.4.7 with PI 542 (updated)	

Statement of Problem and Substantiation for Public Comment

A Task Group on DCNACS was established to revise 72-2022 18.3.7. This started as PI 542. The attached document is the (updated) output of the Task Group.

Related Item

- Updates PI542

Submitter Information Verification

Submitter Full Name: Morris Stoops
Organization: Carrier
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Submittal Date: Wed May 31 17:26:06 EDT 2023

Committee: SIG-NAS

Updates to PI 542:

18.3.7* Notification Appliance Circuits

18.3.7.1 Direct Current Notification Appliance Circuits (DCNACs) shall be designed and installed as follows:

18.3.7.1.1 DCNAC starting voltages shall be based on:

- a) The Control Unit Start Terminal Voltage (CUSTV) of the power source and the current at the minimum input voltage rating of the appliances for circuits that are integrated directly into the Control Unit, and
- b) The Control Module Start Terminal Voltage (CMSTV) of the Control Module (CM) at the minimum input voltage rating of the appliances for circuits that are connected to a CM.

18.3.7.1.2* NACs that use CMs that are not integrated directly with the Control Unit(s) assemblies shall be accounted for in circuit designs.

18.3.7.1.2.1* Module Voltage Adjustment (MVA) for DCNAC CMs, when used, shall be factored into each circuit.

18.3.7.1.2.2* CMs are permitted to be dually rated for MVA and Module Insertion Loss (MIL) when the modules are designed and Listed for DC (DCNAC) and Audio NAC (ACNAC) use.

18.3.7.1.3 All wiring for 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).

18.3.7.1.4 NACs shall be designed based on one of the following:

18.3.7.1.4.1 End-Line-Loaded (ELL), where all the load is calculated to be at the end of the circuit.

18.3.7.1.4.2 Point-To-Point (PTP), where the load is distributed between different points on the circuit and each segment is accounted for in the overall circuit calculation.

A18.3.7

Notification Appliances. The goal of a properly designed and installed system is to ensure that the notification appliances will operate at the required output (sound pressure level, candela output, synchronization, etc.) and durations for 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 DCNACs the appliance nameplate (Listed) voltage and current consumption values are used. This will typically be X mA @ 16 VDC (for a 24 VDC appliance) where X is the actual Listed/Certified current draw of the appliance.

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 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.

A18.3.7.1.2

Control Modules. These typically field-installed (not integrated directly into Control Units) addressable control modules (CM) provide electrical supervision of the DCNAC and/or may provide some control of the 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 CMs may be, but are not limited to:

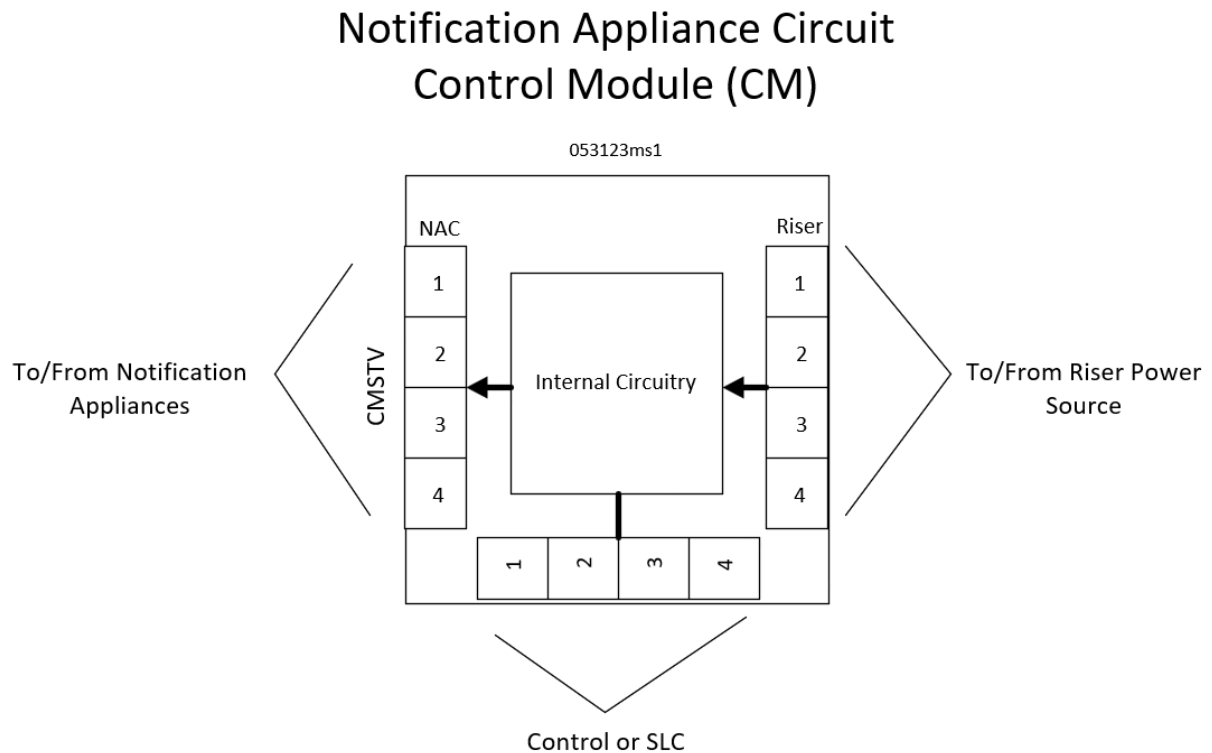
- Relays
- Coders
- Supervision
- Synchronization

A18.3.7.1.2.1

1. **Figure E** provides a block diagram of the internal sections of a typical DCNAC CM. The DCNAC CM may impact the voltage of the connected NAC. This is typically a voltage drop. Some may boost the voltage. In either case, in

DCNACs, this is referred to as Module Voltage Adjustment (MVA) and must be accounted for in the overall system design.

I. **Figure E – NAC CM Internal Block Diagram**



For a CM on a DCNAC, the following is the formula for the unit:

$$\mathbf{CMSTV = Riser\ Terminal\ -/+ \ Internal\ Circuitry}$$

Control Module Start Terminal Voltage (CMSTV)

Example with Values:

$$\mathbf{17.41446 = 18.11446 - 0.7}$$

In the above example:

1. The incoming CM Power Riser provides 18.11446 VDC.
2. The MVA is 0.7 VDC
3. The CMSTV is 17.41446
4. The NAC that is being controlled by this CM could tolerate up to a 1.41446 voltage drop on the circuit. This is calculated by:
 - a. CSMTV of 17.41446
 - b. Notification Appliance low voltage rating of 16
 - c. $1.41446 = 17.41446 - 16$

A18.3.7.1.4

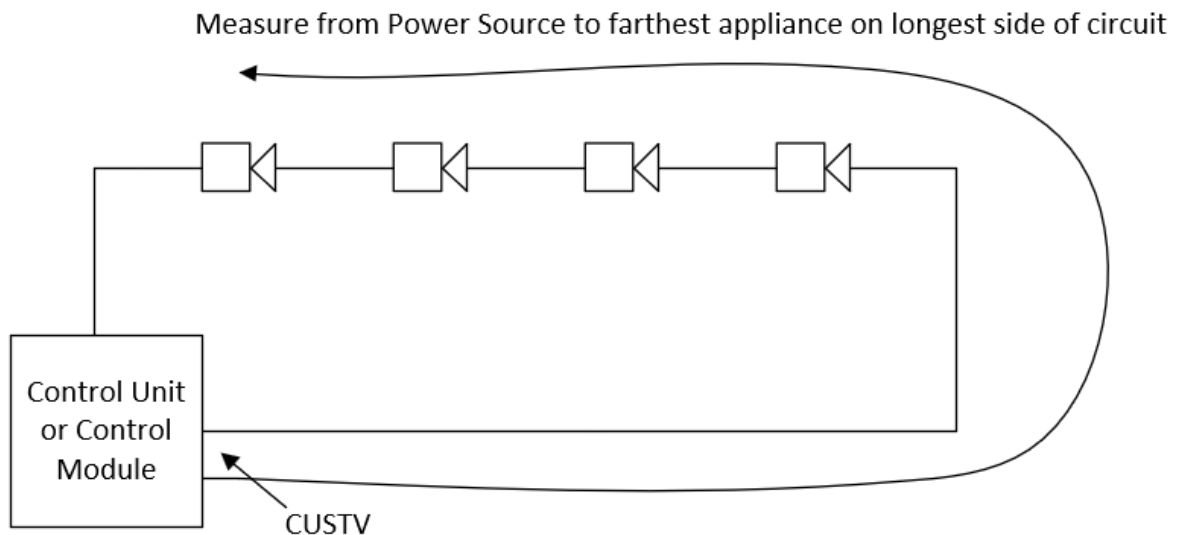
Voltage Drop Calculations: This is the key design factor. There are two acceptable methods. They are:

- **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 based on the individual segment and tested on total resistance and loss.

The following diagram depicts how to measure the circuit length for a Class A NAC:

Class A Measurement For Circuit Length

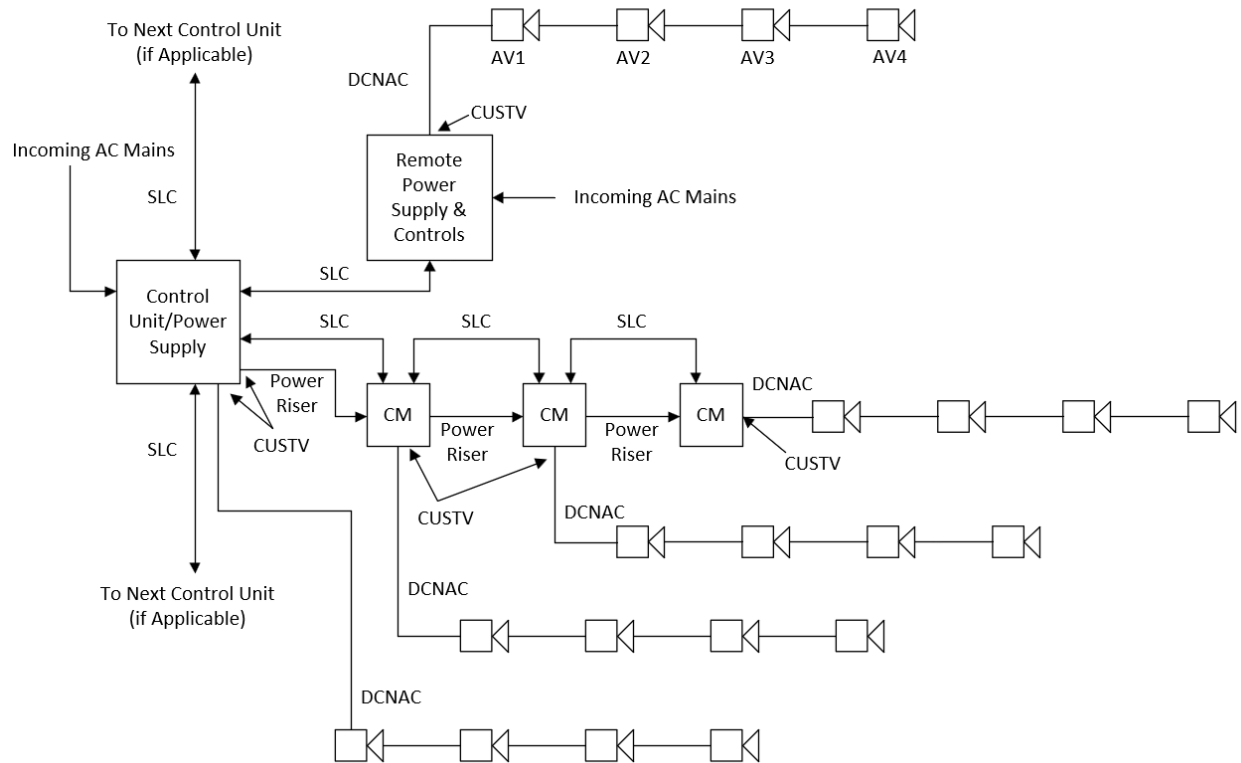
053123ms1



The following diagram depicts the overall power flow and areas of concern for a system:

DC NACS End-To-End Concept Diagram

053123ms1



Note – if the power riser is altered by the CM as the power comes in/out of the CM, that adjustment also needs to be included in the calculations.

A18.3.7.1.2.2 MIL stands for Module Insertion Loss, which is covered in Chapter 24, but is referenced here to provide overall continuity of system design.



Public Comment No. 208-NFPA 72-2023 [Section No. 18.4.1.8]



Based on Task Group review, revise PI 157 & 158 to:18.4.1.8 *

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Restricted Audible Mode Operation (RAMO) Notification

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~~Where used, restricted audible mode operation (RAMO) shall be designed, installed, and tested in accordance with 18.4.1.8.~~

A18.4.1.8 The intent of RAMO is that it be used for areas where loud sounds may be detrimental to typical occupants of the protected areas, such as early-education classrooms, facilities that service people with Autism Spectrum Disorder or other conditions that include sensitivities to noise, etc. The goal is to ensure that the system signals are effective for the protected area, but that the signals used in RAMO areas are less likely to cause undue distress.

18.4.1.8.1

* —

~~Where maximum sound pressure levels are required for a protected space, this operation shall be referred to as RAMO.~~

Where the risk analysis of a protected area dictates the use of RAMO, or the AHJ requires it, the following shall apply:

18.4.1.8.

2—

1.1 RAMO areas shall be indicated on the project drawings.

18.4.1.8.

3—

1.2 RAMO shall be permitted to be used only where there is

constantly

trained, awake and mobile staff in the protected area .

18.4.1.8.

4—

~~RAMO shall not be used in protected areas where people could be sleeping without constantly awake and mobile staff.~~

18

1.3* All audible signals within a RAMO protected area shall be in conformance with Section 18.4.6.3.

A18.4.1.8.

5—

~~Where required by the AHJ, 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 is at least 5 dB above the maximum sound pressure level having a duration of at least 60 seconds, and not more than 20 dB above the average ambient sound pressure level, measured at 5 ft (1.5 m) above the finished floor in the protected space.~~

1.3 Lower frequency audible signals are less obtrusive to people with Autism Spectrum Disorder and people that have sensitivities to higher frequency and louder audible

signals. Note that the referenced Section addresses sleeping areas; however, RAMO audible appliances should the capability to produce the 520 Hz +/- 10% signals.

18.4.1.8.

~~5.1-~~

~~The minimum sound pressure level produced in the protected area by the RAMO system shall be 45 dBA.~~

~~18.4.1.8.6 -~~

~~Audible notification appliances for RAMO shall be listed for a minimum of 45 dBA at 10 ft (3 m) on-axis.~~

~~18~~

1.4* The requirements of Section 18.4.5 shall apply to all RAMO protected areas.

A18.4.1.8.

~~7- RAMO Ramp-Up:~~

~~1.4 Section 18.4.~~

~~1.8.7.1-~~

~~RAMO audible appliances shall be permitted to ramp-up by starting their output cycle at 50 percent of the final volume for the first third of the output cycle.~~

~~18.4.1.8.7.2 -~~

~~RAMO ramp-up shall not be permitted on live paging operation.~~

~~18.4.1.8.7.3 -~~

~~RAMO audible output that use RAMO ramp-up shall be measured at the maximum tone output of the appliance.~~

~~18.4.1.8.8 -~~

~~RAMO areas shall be reviewed annually to determine if the occupancy has changed~~

5 is for written for Private Mode, but all of the requirements are applicable to RAMO protected areas. One of the key elements is that the system dB design is lowered from 15 dBA-fast over ambient to 10 dBA-fast and that visual notification appliances are required throughout the RAMO protected areas .

18.4.1.8.

~~9-~~

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

2 All audible and visual notification signals in a RAMO protected area shall be synchronized with adjoining notification zones .

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
72-2025_RAMO_PI_157-158_final_053123ms1.docx	full content in case there are any errors in uploading the update PI 157/158 information	

Statement of Problem and Substantiation for Public Comment

A Task Group was assigned to review PI 157 & 158. TG members consulted with medical and professionals about the audible operations. TG then revised and simplified the original PIs and has submitted this update. This is not new material.

Related Item

- 1st draft report PI 157 & 158

Submitter Information Verification

Submitter Full Name: Morris Stoops

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Submittal Date: Wed May 31 11:38:01 EDT 2023

Committee: SIG-NAS

Based on Task Group review, revise PI 157 & 158 to:

18.4.1.8* Restricted Audible Mode Operation (RAMO) Notification

A18.4.1.8 The intent of RAMO is that it be used for areas where loud sounds may be detrimental to typical occupants of the protected areas, such as early-education classrooms, facilities that service people with Autism Spectrum Disorder or other conditions that include sensitivities to noise, etc. The goal is to ensure that the system signals are effective for the protected area, but that the signals used in RAMO areas are less likely to cause undue distress.

18.4.1.8.1 Where the risk analysis of a protected area dictates the use of RAMO, or the AHJ requires it, the following shall apply:

18.4.1.8.1.1 RAMO areas shall be indicated on the project drawings.

18.4.1.8.1.2 RAMO shall be permitted to be used only where there is trained, awake and mobile staff in the protected area.

18.4.1.8.1.3* All audible signals within a RAMO protected area shall be in conformance with Section 18.4.6.3.

A18.4.1.8.1.3 Lower frequency audible signals are less obtrusive to people with Autism Spectrum Disorder and people that have sensitivities to higher frequency and louder audible signals. Note that the referenced Section addresses sleeping areas; however, RAMO audible appliances should have the capability to produce the 520 Hz +/- 10% signals.

18.4.1.8.1.4* The requirements of Section 18.4.5 shall apply to all RAMO protected areas.

A18.4.1.8.1.4 Section 18.4.5 is for written for Private Mode, but all of the requirements are applicable to RAMO protected areas. One of the key elements is that the system dB design is lowered from 15 dBA-fast over ambient to 10 dBA-fast and that visual notification appliances are required throughout the RAMO protected areas.

18.4.1.8.2 All audible and visual notification signals in a RAMO protected area shall be synchronized with adjoining notification zones.



Public Comment No. 195-NFPA 72-2023 [Sections 18.4.1.8, 18.4.1.9]

Sections 18.4.1.8, 18.4.1.9

18.4.1.8* Restricted Audible Mode Operation (RAMO) Notification.

Where used, restricted audible mode operation (RAMO) shall be designed, installed, and tested in accordance with 18.4.1.8.

18.4.1.8.1*

Where maximum sound pressure levels are required for a protected space, this operation shall be referred to as 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 constantly awake and mobile staff.

18.4.1.8.4

RAMO shall not be used in protected areas where people could be sleeping without constantly awake and mobile staff.

18.4.1.8.5

Where required by the AHJ, 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 is at least 5 dB above the maximum sound pressure level having a duration of at least 60 seconds, and not more than 20 dB above the average ambient sound pressure level, measured at 5 ft (1.5 m) above the finished floor in the protected space.

18.4.1.8.5.1

The minimum sound pressure level produced in the protected area by the RAMO system shall be 45 dBA.

18.4.1.8.6

Audible notification appliances for RAMO shall be listed for a minimum of 45 dBA at 10 ft (3 m) on axis.

18.4.1.8.7 RAMO Ramp-Up.

18.4.1.8.7.1

RAMO audible appliances shall be permitted to ramp-up by starting their output cycle at 50 percent of the final volume for the first third of the output cycle.

18.4.1.8.7.2

RAMO ramp-up shall not be permitted on live paging operation.

18.4.1.8.7.3

RAMO audible output that use RAMO ramp-up shall be measured at the maximum tone output of the appliance.

18.4.1.8.8

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

18.4.1.8.9

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

18.4.1.9 Maximum Public Mode Audible Levels.**18.4.1.9.1***

If the risk assessment determines it is warranted or where design or actual testing indicates that the public mode audible notification SPL exceeds 45 dB 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 be permitted to require that the audible notification SPL output be lowered to a maximum of 45 dB 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

Reductions in the public mode sound pressure level of a protected space shall be recorded in system documentation.

18.4.1.9.1.2

Each area where the public mode sound pressure level has been reduced shall be reviewed annually to determine if the application has changed.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
NFPA_72_PC_Submission_markup_Sections_18.4.1.8_18.4.1.9.docx		

Statement of Problem and Substantiation for Public Comment

This comment is to clarify the requirements for neurologically diverse population and audible signals. The term ADS already exists within the body of NFPA 72. A new acronym is unnecessary. The proposed language provides clarification to the conditions where reduced volume may be employed and how to ramp up the volume. Its unclear as to the was inferred by the first third of the output cycle, so 60 seconds was provided for clarity. For example a temporal pattern followed by a voice announcement. Does this mean the first third is the temporal pattern, the voice or both? Note the annual review was modified to reference the requirements already existing in Chapter 14.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 196-NFPA 72-2023 [Section No. A.18.4.1.8]	
Public Comment No. 197-NFPA 72-2023 [Section No. A.18.4.1.8.1]	
Public Comment No. 198-NFPA 72-2023 [Section No. A.18.4.1.9.1]	

Related Item

- FR 5324

Submitter Information Verification

Submitter Full Name: Megan Hayes

Organization: NEMA

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State:

Zip:

Submittal Date: Tue May 30 17:42:32 EDT 2023

Committee: SIG-NAS

Sections 18.4.1.8, 18.4.1.9

18.4.1.8* ~~Restricted Audible Mode Operation (RAMO) Notification. Accommodations for persons adversely affected by loud noises.~~

~~Where used, restricted audible mode operation (RAMO) shall be designed, installed, and tested in accordance with 18.4.1.8.~~

A.18.4.1.8

In some situations, such as personnel sensitive to loud noises, systems should be designed to limit the maximum sound pressure level in an acoustically distinguishable space (ADS).

18.4.1.8.1*

Where persons adversely affected by loud noises are present within the ADS, the system designer shall include accommodations as provided in 18.4.1.2 – 18.4.1.4.~~Where maximum sound pressure levels are required for a protected space, this operation shall be referred to as RAMO.~~

A.18.4.1.8.1

The purpose of ~~RAMO this section 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 to avoid causing undue health issues for facility occupants. This is different than public or private mode audible notification — those two modes set the minimum sound pressure level for the use, but do not address the maximum amplitudes.

An example of a protected space in which systems should be designed to limit the maximum sound pressure level is one used by occupants who are sensitive to loud sounds (e.g., facilities for people with autism, facilities for children). The system designer facility's risk assessment should consider address the use of reducing the maximum volume and utilizing ramp-up of volume~~RAMO~~. Instances where the “instantly on and very loud” system notification appliances frighten or cause undue panic of occupants have occurred, which can impede the orderly evacuation of the protected space. For these types of environments, voice alarm systems that use ~~RAMO~~ ramp-up for pre-recorded messages are preferred.

18.4.1.8.2

~~RAMO areas~~ Acoustically Distinguishable Spaces(s) (ADS) and the maximum sound pressure level shall be indicated on the project drawings.

18.4.1.8.3

~~RAMO~~ ADS(S) for accommodation shall be permitted to be used only where there is constantly awake and mobile staff.

~~18.4.1.8.4~~

~~RAMO shall not be used in protected areas where people could be sleeping without constantly awake and mobile staff.~~

18.4.1.8.5~~4~~

Where ~~permitted~~ required by the AHJ, the ~~RAMO~~ system shall be designed, installed, and maintained such that the sound pressure level produced by the ~~RAMO~~ notification appliances throughout the ADS ~~protected space~~ is at least 5 dB above the maximum ambient sound pressure level ~~having a duration of~~

~~at least 60 seconds~~, and not more than 20 dB above the average ambient sound pressure level, measured at 5 ft (1.5 m) above the finished floor in the ~~ADS~~protected space.

18.4.1.8.54.1

The minimum sound pressure level produced in the ~~ADS protected area by the RAMO system~~ shall be 45 dBA.

18.4.1.8.65

Audible notification appliances ~~for RAMO~~ shall be listed for a minimum of 45 dBA at 10 ft (3 m) on axis.

18.4.1.8.7-6 RAMO Ramp-Up.

18.4.1.8.76.1

~~RAMO audible~~ Audible appliances in the ADS for accommodation shall be permitted to ramp-up linearly by starting ~~their output cycle~~ at 50 percent of the final sound pressure level ~~volume~~ for the first ~~third of the output cycle~~ 60 seconds.

18.4.1.8.76.2

~~RAMO~~ The ramp-up shall not be permitted on live paging operation.

18.4.1.8.73-

~~RAMO audible output that use RAMO ramp-up shall be measured at the maximum tone output of the appliance.~~

18.4.1.8.8-7

~~RAMO areas~~ The ADS(s) shall be reviewed annually ~~to determine if the occupancy has changed in~~ accordance with Chapter 14.

18.4.1.8.9-8

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

18.4.1.9 Maximum Public Mode Audible Levels.

18.4.1.9.1*

~~If the risk assessment determines it is warranted or where design or actual testing indicates that the public mode audible notification SPL exceeds 45 dB 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 be permitted to require that the audible notification SPL output be lowered to a maximum of 45 dB 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.~~

A-18.4.1.9.1

~~The purpose of this paragraph 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 should be reviewed regularly for changes that might require system modifications.~~

~~18.4.1.9.1.1~~

~~Reductions in the public mode sound pressure level of a protected space shall be recorded in system documentation.~~

~~18.4.1.9.1.2~~

~~Each area where the public mode sound pressure level has been reduced shall be reviewed annually to determine if the application has changed.~~



Public Comment No. 248-NFPA 72-2023 [Section No. 18.4.1.8.8]

18.4.1.8.8

RAMO areas shall be ~~reviewed annually to determine if the occupancy has changed~~ tested in accordance with Chapter 14 .

Statement of Problem and Substantiation for Public Comment

FR-5352 added annual testing requirements that should be located in Chapter 14 and not in Chapter 18. Public Comment No. 247 has been added to Chapter 14 to cover these RAMO testing requirements as written in FR-5352. Changes to these requirements during the Second Draft should be coordinated with Chapter 14 and the new section 14.4.13.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
<u>Public Comment No. 247-NFPA 72-2023 [New Section after 14.4.12.3]</u>	Dependent
<u>Public Comment No. 249-NFPA 72-2023 [Section No. 18.4.1.9.1.2]</u>	

Related Item

- FR-5352

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Submitter Full Name: Larry Rietz

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Submittal Date: Wed May 31 19:19:40 EDT 2023

Committee: SIG-NAS



Public Comment No. 249-NFPA 72-2023 [Section No. 18.4.1.9.1.2]

18.4.1.9.1.2

Each area where the public mode sound pressure level has been reduced shall be reviewed annually to determine if the application has changed tested in accordance with Chapter 14 .

Statement of Problem and Substantiation for Public Comment

FR-5352 added annual testing requirements that should be located in Chapter 14 and not in Chapter 18. Public Comment No. 247 has been added to Chapter 14 to cover these maximum public mode audible level testing requirements as written in FR-5352. Changes to these requirements during the Second Draft should be coordinated with Chapter 14 and the new section 14.4.14.

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
<u>Public Comment No. 247-NFPA 72-2023 [New Section after 14.4.12.3]</u>	Dependent
<u>Public Comment No. 248-NFPA 72-2023 [Section No. 18.4.1.8.8]</u>	Similar Change

Related Item

- FR-5352

Submitter Information Verification

Submitter Full Name: Larry Rietz

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Submittal Date: Wed May 31 19:23:24 EDT 2023

Committee: SIG-NAS



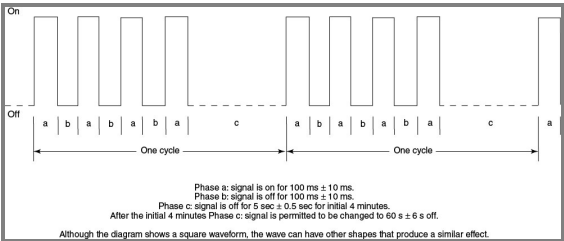
Public Comment No. 20-NFPA 72-2023 [Section No. 18.4.3.2]

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.



Additional Proposed Changes

File Name	Description	Approved
NFPA72-18.4.3.2.png	The existing Figure 18.4.3.2 does not reflect the text of 18.4.3.2(1) accurately. Specifically, the text reads: 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. The figure does not show 4 cycles of "on" and "off" followed by 5 seconds of "off", what the figure does show is 3 cycles of "on" and "off", followed by 100 milliseconds "on", followed by 5 seconds "off". The final 100 milliseconds "off" of the 4th cycle, before the 5 seconds "off", is missing from the figure. The attached image shows the missing 100 milliseconds "off" segment in red.	

Statement of Problem and Substantiation for Public Comment

The existing Figure 18.4.3.2 does not reflect the text of 18.4.3.2(1) accurately. Specifically, the text reads:
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.

The existing figure does not show 4 cycles of "on" and "off" followed by 5 seconds of "off". What the figure does show is 3 cycles of "on" and "off", followed by 100 milliseconds "on", followed by 5 seconds "off".

The problem is the final 100 milliseconds "off" of the 4th cycle, before the 5 seconds "off", is missing from the figure. The attached image shows the missing 100 milliseconds Phase b "off" segment in red.

Related Item

•

Submitter Information Verification

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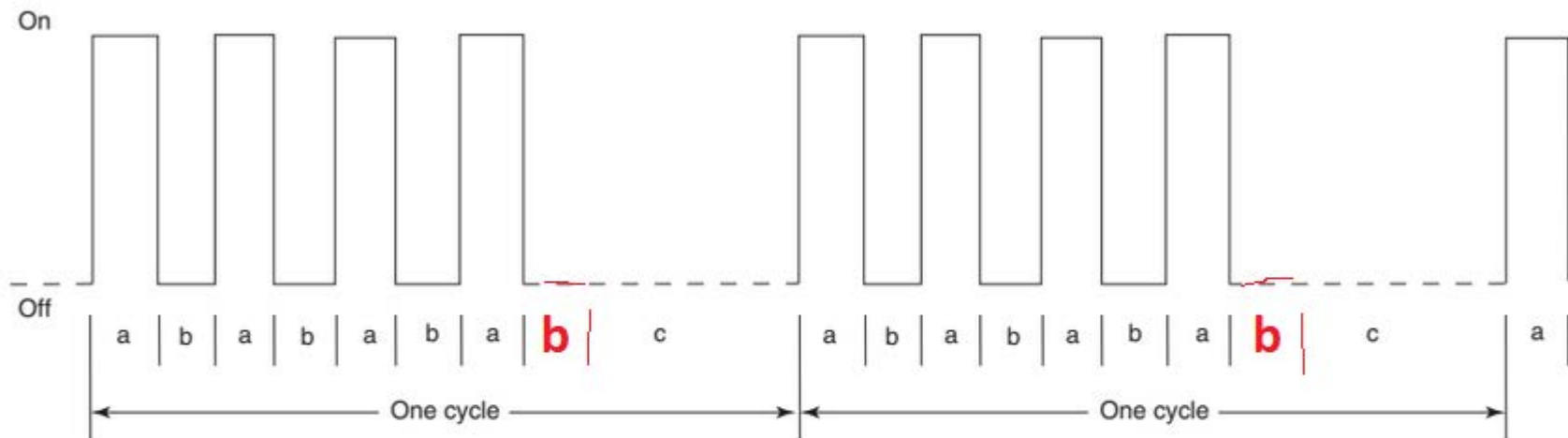
City:

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Submittal Date: Wed Apr 05 12:20:49 EDT 2023

Committee: SIG-NAS



Phase a: signal is on for $100 \text{ ms} \pm 10 \text{ ms}$.

Phase b: signal is off for $100 \text{ ms} \pm 10 \text{ ms}$.

Phase c: signal is off for $5 \text{ sec} \pm 0.5 \text{ sec}$ for initial 4 minutes.

After the initial 4 minutes Phase c: signal is permitted to be changed to $60 \text{ s} \pm 6 \text{ s}$ off.

Although the diagram shows a square waveform, the wave can have other shapes that produce a similar effect.

FIGURE 18.4.3.2 Temporal Pattern Parameters — Carbon Monoxide Signal.



Public Comment No. 151-NFPA 72-2023 [Section No. 18.5.4]

18.5.4* Appliance Photometrics.

The light output shall comply with the polar dispersion requirements for public mode signaling as described in UL 1638, *Visible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories, or equivalent*.

Statement of Problem and Substantiation for Public Comment

A correlating committee task group was formed to review references to product and installation codes and standards. Many of the references, add the words "applicable standards such as" or "or equivalent", to indicate other standards could be accepted. This leads to conflict, because this code clearly indicates the following:

10.3.1 Equipment constructed and installed in conformity with this code shall be listed for the purpose for which it used.

There are many other references that reinforce 10.3.1 such as this one. The product and installation codes and standards that are reference in NFPA 72 by title have been reviewed by chapter committee members to verify they are providing verification of the performance, safety and reliability criteria identified in NFPA 72 and that there are no conflicts to the performance, safety and reliability criteria of this code.

Using terms like "applicable standards such as" or "or equivalent" that allow alternate product and installation codes and standards to be accepted without the review of the chapter committees is putting undue burdens on AHJs, the Engineering community and life safety systems owners to be experts in all of the possible alternate product and installation codes and standards.

This language is not to say there is only one choice, it is to say all alternates should be called out in the code for proper verification to the requirements of NFPA 72.

Related Item

- CN-18

Submitter Information Verification

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Submittal Date: Tue May 23 16:39:55 EDT 2023

Committee: SIG-NAS

**Public Comment No. 152-NFPA 72-2023 [Section No. 18.5.5.9.1]****18.5.5.9.1**

Any design that provides a minimum of 0.0375 lumens/ft² (0.4036 lumens/m²) of illumination at any point within the covered area at all angles specified by the polar dispersion planes for wall- or ceiling-mounted public mode visual notification appliances in UL 1638, *Visible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories*; ~~or equivalent~~, as calculated for the maximum distance from the nearest visual notification appliance, shall be permitted in lieu of the requirements of 18.5.5, excluding 18.5.5.10.

Statement of Problem and Substantiation for Public Comment

A correlating committee task group was formed to review references to product and installation codes and standards. Many of the references, add the words "applicable standards such as" or "or equivalent", to indicate other standards could be accepted. This leads to conflict, because this code clearly indicates the following:

10.3.1 Equipment constructed and installed in conformity with this code shall be listed for the purpose for which it used.

There are many other references that reinforce 10.3.1 such as this one. The product and installation codes and standards that are reference in NFPA 72 by title have been reviewed by chapter committee members to verify they are providing verification of the performance, safety and reliability criteria identified in NFPA 72 and that there are no conflicts to the performance, safety and reliability criteria of this code.

Using terms like "applicable standards such as" or "or equivalent" that allow alternate product and installation codes and standards to be accepted without the review of the chapter committees is putting undue burdens on AHJs, the Engineering community and life safety systems owners to be experts in all of the possible alternate product and installation codes and standards.

This language is not to say there is only one choice, it is to say all alternates should be called out in the code for proper verification to the requirements of NFPA 72.

Related Item

- CN-18

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Submittal Date: Tue May 23 16:41:24 EDT 2023

Committee: SIG-NAS



Public Comment No. 153-NFPA 72-2023 [Section No. 18.5.5.9.2.1]

18.5.5.9.2.1

Documentation provided to the authority having jurisdiction shall include the inverse square law calculations using each of the vertical and horizontal polar distribution angles in UL 1638, *Visible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories*, or equivalent.

Statement of Problem and Substantiation for Public Comment

A correlating committee task group was formed to review references to product and installation codes and standards. Many of the references, add the words "applicable standards such as" or "or equivalent", to indicate other standards could be accepted. This leads to conflict, because this code clearly indicates the following:

10.3.1 Equipment constructed and installed in conformity with this code shall be listed for the purpose for which it used.

There are many other references that reinforce 10.3.1 such as this one. The product and installation codes and standards that are reference in NFPA 72 by title have been reviewed by chapter committee members to verify they are providing verification of the performance, safety and reliability criteria identified in NFPA 72 and that there are no conflicts to the performance, safety and reliability criteria of this code.

Using terms like "applicable standards such as" or "or equivalent" that allow alternate product and installation codes and standards to be accepted without the review of the chapter committees is putting undue burdens on AHJs, the Engineering community and life safety systems owners to be experts in all of the possible alternate product and installation codes and standards.

This language is not to say there is only one choice, it is to say all alternates should be called out in the code for proper verification to the requirements of NFPA 72.

Related Item

- CN-18

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Submittal Date: Tue May 23 16:44:57 EDT 2023

Committee: SIG-NAS

**Public Comment No. 154-NFPA 72-2023 [Section No. 18.5.5.9.2.2]****18.5.5.9.2.2**

The inverse square law calculations shall account for the effects of polar distribution using one of the following:

- (1) The percentages from the applicable table(s) in UL 1638, *Visible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories*, ~~or equivalent~~
- (2) The actual results of laboratory tests of the specific appliance to be used as recorded by the listing organization

Statement of Problem and Substantiation for Public Comment

A correlating committee task group was formed to review references to product and installation codes and standards. Many of the references, add the words "applicable standards such as" or "or equivalent", to indicate other standards could be accepted. This leads to conflict, because this code clearly indicates the following:

10.3.1 Equipment constructed and installed in conformity with this code shall be listed for the purpose for which it used.

There are many other references that reinforce 10.3.1 such as this one. The product and installation codes and standards that are reference in NFPA 72 by title have been reviewed by chapter committee members to verify they are providing verification of the performance, safety and reliability criteria identified in NFPA 72 and that there are no conflicts to the performance, safety and reliability criteria of this code.

Using terms like "applicable standards such as" or "or equivalent" that allow alternate product and installation codes and standards to be accepted without the review of the chapter committees is putting undue burdens on AHJs, the Engineering community and life safety systems owners to be experts in all of the possible alternate product and installation codes and standards.

This language is not to say there is only one choice, it is to say all alternates should be called out in the code for proper verification to the requirements of NFPA 72.

Related Item

- CN-18

Submitter Information Verification

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Submittal Date: Tue May 23 16:46:18 EDT 2023

Committee: SIG-NAS



Public Comment No. 155-NFPA 72-2023 [Section No. 18.10.2]

18.10.2* Performance.

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

Statement of Problem and Substantiation for Public Comment

A correlating committee task group was formed to review references to product and installation codes and standards. Many of the references, add the words "applicable standards such as" or "or equivalent", to indicate other standards could be accepted. This leads to conflict, because this code clearly indicates the following:

10.3.1 Equipment constructed and installed in conformity with this code shall be listed for the purpose for which it used.

There are many other references that reinforce 10.3.1 such as this one. The product and installation codes and standards that are reference in NFPA 72 by title have been reviewed by chapter committee members to verify they are providing verification of the performance, safety and reliability criteria identified in NFPA 72 and that there are no conflicts to the performance, safety and reliability criteria of this code.

Using terms like "applicable standards such as" or "or equivalent" that allow alternate product and installation codes and standards to be accepted without the review of the chapter committees is putting undue burdens on AHJs, the Engineering community and life safety systems owners to be experts in all of the possible alternate product and installation codes and standards.

This language is not to say there is only one choice, it is to say all alternates should be called out in the code for proper verification to the requirements of NFPA 72.

Related Item

- CN-18

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Submittal Date: Tue May 23 16:48:16 EDT 2023

Committee: SIG-NAS



Public Comment No. 196-NFPA 72-2023 [Section No. A.18.4.1.8]

A.18.4.1.8

In some situations, such as personnel sensitive to loud noises, systems should be designed to limit the maximum sound pressure level in an acoustically distinguishable space (ADS).

Statement of Problem and Substantiation for Public Comment

See substantiation for requirement 18.4.1.8, 18.4.1.9, PC No. 195-NFPA 72-2023

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 195-NFPA 72-2023 [Sections 18.4.1.8, 18.4.1.9]	

Related Item

- FR 5324

Submitter Information Verification

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Committee: SIG-NAS



Public Comment No. 197-NFPA 72-2023 [Section No. A.18.4.1.8.1]

A.18.4.1.8.1



The purpose of ~~RAMO information~~ this section 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 to avoid causing undue health issues for facility occupants. This is different than public or private mode audible notification — those two modes set the minimum sound pressure level for the use, but do not address the maximum amplitudes.

An example of a protected space in which systems should be designed to limit the maximum sound pressure level is one used by occupants who are sensitive to loud sounds (e.g., facilities for people with autism, facilities for children). The ~~facility's risk~~ system designer assessment should ~~address the use of RAMO~~ consider reducing the maximum volume and utilizing ramp-up of volume. Instances where the "instantly on and very loud" system notification appliances frighten or cause undo panic of occupants have occurred, which can impede the orderly evacuation of the protected space. For these types of environments, voice alarm systems that ~~use RAMO~~ use ramp-up for pre-recorded messages are preferred.

Statement of Problem and Substantiation for Public Comment

See substantiation for requirement 18.4.1.8, 18.4.1.9, PC No. 195-NFPA 72-2023

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 195-NFPA 72-2023 [Sections 18.4.1.8, 18.4.1.9]	
<u>Related Item</u>	
• FR 5324	

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Committee: SIG-NAS



Public Comment No. 198-NFPA 72-2023 [Section No. A.18.4.1.9.1]

A.18.4.1.9.1 —

~~The purpose of this paragraph 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 should be reviewed regularly for changes that might require system modifications.~~

Statement of Problem and Substantiation for Public Comment

See substantiation for requirement 18.4.1.8, 18.4.1.9, PC No. 195-NFPA 72-2023

Related Public Comments for This Document

<u>Related Comment</u>	<u>Relationship</u>
Public Comment No. 195-NFPA 72-2023 [Sections 18.4.1.8, 18.4.1.9]	
<u>Related Item</u>	
• FR 5324	

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Committee: SIG-NAS



Public Comment No. 164-NFPA 72-2023 [Section No. A.18.10.2]

A.18.10.2



Notification appliances ~~are available for the deaf and hard of hearing. These appliances include including~~ , but ~~are~~ not limited to, supplemental tactile notification appliances. ~~Such tactile are available for the deaf and hard of hearing. Tactile notification appliances can be capable of awakening people. Tactile~~ Such appliances can ~~initiate in response to the activation of an audible smoke alarm, through~~ , through hard wiring into the fire alarm system or by wireless methods, initiate in response to the activation of an audible smoke alarm .

Some tests show that visual notification appliances might not be effective in awakening some sleeping individuals during an emergency. Some tactile ~~devices~~ notification appliances can be more effective in awakening individuals, regardless of hearing levels, from sleep. See the FPRF report, *Review of Alarm Technologies for Deaf and Hard of Hearing Populations*, for further details.

Additional Proposed Changes

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
CN_No._21.pdf	NFPA 72 Correlating Note No. 21	

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note 21 appeared in the First Draft Report on First Revision No. 5327.

During editorial review, the editors recommended changes to this section to make the language easier to understand:

"Notification appliances including, but not limited to, supplemental tactile notification appliances are available for the deaf and hard of hearing. Tactile notification appliances can be capable of awakening people. Such appliances can, through hard wiring into the fire alarm system or by wireless methods, initiate in response to the activation of an audible smoke alarm.

Some tests show that visual notification appliances might not be effective in awakening some sleeping individuals during an emergency. Some tactile notification appliances can be more effective in awakening individuals, regardless of hearing levels, from sleep. See the FPRF report, *Review of Alarm Technologies for Deaf and Hard of Hearing Populations*, for further details." Coordinate verbiage between SIG NAS and SIG HOU and consider revisions regarding the use of the term 'audible smoke alarm'.

Related Item

- FR - 5327

Submitter Information Verification

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Submittal Date: Wed May 24 15:45:01 EDT 2023
Committee: SIG-NAS



Public Comment No. 45-NFPA 72-2023 [Section No. A.18.10.2]

A.18.10.2

Notification appliances are available for the deaf and hard of hearing. These appliances include, but are not limited to, supplemental tactile notification appliances. Such tactile notification appliances can be capable of awakening people. Tactile appliances can initiate in response to the activation of an audible smoke alarm, through hard wiring into the fire alarm system or by wireless methods.

Some tests show that visual notification appliances might not be effective in awakening some sleeping individuals during an emergency. Some tactile devices can be more effective in awakening individuals, regardless of hearing levels, from sleep. See the FPRF report, *Review of Alarm Technologies for Deaf and Hard of Hearing Populations*, [and A.29.5.10.2](#) for further details.

Statement of Problem and Substantiation for Public Comment

The NFPA Disability Access Review Advisory Committee (DARAC) supplies this Public Comment to provide the reader with additional annex commentary that is pertinent to this section.

- The topic of tactile notification appliances is also addressed in chapter 29.
- The annex material in A.29.5.10.2 provides more comprehensive details regarding some of the factors affecting the effectiveness of some tactile notification devices.

Related Item

- FR 5327

Submitter Information Verification

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