Description, Purpose and Relevance of the Egress Marking Visible Notification Appliance for the Hearing Impaired ("Egress Marking Visible Notification Appliance", "EMVNA" or "Integrated-EMVNA")

Summary

Conventional visible notification appliances and methods today are nearly entirely based on designs that utilize Xenon light sources which are presented in lensed stroboscopic emergency strobe devices designed to broadcast extremely bright "indirect" light throughout a space from a single point of light device which, by law is required to be installed at or above 80" over f.f.e. (finished floor elevation) and which are hard-wire integrated into and through the notification appliance circuit (N.A.C.) driven by the fire panel which is designed to power the appliances and to synchronize any given visible notification appliance with its neighboring visible notification appliances and/or other appliances in/on the N.A.C. An overwhelming majority of these appliances take a very similar form in terms of design, materials, installation configurations and operational characteristics and the fire alarm industry, in general, has settled for this typical emergency strobe or horn-strobe as its industry accepted appliance.

Moreover, in order to meet the hardwired visual notification device for hearing impair requirements under code/law for use in the public domain under the laws and regulations governing emergency fire systems, all visible notification appliances, hence, all of the idustry accepted traditional conventional emergency strobe light devices are required to be marked to "*UL 1971- Signaling Devices for the Hearing Impaired*." That all codes, ordinances and laws governing the emergency notification systems in public accommodation settings throughout the United States, tie visible notification appliances for the hearing impaired and methods back to UL 1971 as the benchmark standard and they must comply with UL 1971 in order to be distributed and used throughout the nation.

Enter the EMVNA technology:

Prior to the release of the EMVNA linear luminary form of visible notification appliance technology, there existed no other "linear" luminary based visible notification appliance for the hearing impaired. This innovation, as a code-compliant Supplementary Visible Notification Appliance for the Hearing Impaired (pursuant to the National Fire Alarm Code- NFPA 72) is the "first" notification appliance to not only meet the requirements of fire codes, laws, regulations and ordinances that govern public accommodative settings and the requirements of UL 1971 Standards per the laws, but, it takes the marginal capabilities and benefits visible notification devices to an entirely new level of efficacy relative to traditional and/or conventional Xenon light lensed stroboscopic "indirect" single point-source emergency strobe devices installed at elevationally high (80" over F.F.E or higher) and which are hard-wire integrated into the N.A.C. An synchronized with other space-indigenous visible notification appliances. This is "especially true if the evacuating occupant is hearing impaired.

The process of becoming a UL 1971 compliant "linear" luminary based visible notification appliance or method for the hearing impaired is discussed in detail in the attached "A Discussion of the hardwired linear strobe for the Deaf and Hard of Hearing" white paper and is based on the following (excerpt) stepping stones of logic; which are clearly footed in specific codes, laws, and/or requirements imposed by the authorities governing such laws and have been estibalished and enforced since the Americans with Disabilities Act of 1990 for all hardwired visual notification apliances for the hearing impaired. Such processes must thus apply to all new inovations and advancements in technology entering the industy and are supported and defended by the Department of Justice under many of the regulations discussed herein.

"By law, under the Americans with Disabilities Act of 1990, et seq., and the myriad of adopted American codes and laws reflecting its principles that stem from it, technological advancements that level the playing field for disabled persons are expressly encouraged and cannot be denied their place in service to the disabled in public accommodations, commercial facilities and other qualifying ADA protected facilities, provided that they can be reasonably attained and the result of their use provides an equal benefit. Moreover, the responsibility and obligation of Authorities Having Jurisdiction over utilization and the embrace of such new advancements in the field is not bestowed upon the AHJ without an inherent commensurate level of authority reasonably required to enforce the use of such advancement in his/her thoughtful discretion when the benefits of its use renders an equal opportunity."

Important Definitions: There are a handful of important terms whose definitions are worthy of understanding given the frequency with which they are used throughout this discussion paper. As defined in the ADA, they are as follows:

"***Public Accommodation***" refers to any private place of business that is open to the public for the sale or lease of goods and services. These are the places and locations whose owners, operators, tenants and authorities must concern themselves with technologies like the EMVNA. The ADA lists them in the following 12 general categories:

1. **Places of lodging** (e.g. , inns, hotels, motels) (except for owner-occupied establishments renting fewer than six rooms);
2. **Establishments serving food or drink** (e.g. , restaurants and bars);
3. **Places of exhibition or entertainment** (e.g. , motion picture houses, theaters, concert halls, stadiums);
4. **Places of public gathering** (e.g. , auditoriums, convention centers, lecture halls);
5. **Sales or rental establishments** (e.g. , bakeries, grocery stores, hardware stores, shopping centers);
6. **Service establishments** (e.g. , laundromats, dry-cleaners, banks, barber shops, beauty shops, travel services, shoe repair services, funeral parlors, gas stations, offices of accountants or lawyers, pharmacies, insurance offices, professional offices of health care providers, hospitals);
7. **Public transportation terminals, depots, or stations** (not including facilities relating to air transportation);
8. **Places of public display or collection** (e.g. , museums, libraries, galleries);
9. **Places of recreation** (e.g. , parks, zoos, amusement parks);
10. **Places of education** (e.g. , nursery schools, elementary, secondary, undergraduate, or postgraduate private schools);
11. **Social service center establishments** (e.g. , day care centers, senior citizen centers, homeless shelters, food banks, adoption agencies); and
12. **Places of exercise or recreation** (e.g. , gymnasiums, health spas, bowling alleys, golf courses).[1]

As defined in the ADA, there are two types of action employers or public places must undertake for people with disabilities: "*Reasonable Accommodations*" and "*Readily Achievable*."

"***Reasonable Accommodations***" has to do with employees, and no modifications must be undertaken to fulfill the "Reasonable Accommodations" requirement until a qualified individual with a disability has been hired." Reasonable Accommodations" must be made unless they impose a significant difficulty or expense.[2]

"*Readily Achievable*" has to do with clients or guests. The term means easily accomplishable and able to be carried out without much difficulty or expense. "Readily Achievable" modifications must be made in anticipation of a disabled guest's or client's needs, before they ever arrive on the premises.[3]

Starting Note & Clarification: For purposes of this discussion, unless otherwise denoted, the term "EMVNA" and the acronym "EMVNA",(a/k/a, the I-EMVNA), which refers to the hard-wired system-integrated pending listing by Intertek (ETL) and conforms to *UL 1971; Signaling Devices for the Hearing Impaired* as an Egress Marking Visible Notification Appliance which connects into the fire alarm system i.e. the "Notification Appliance Circuit (NAC)) is the primary focus of the discussion below. The EMVNA is available in a Single-Station format which is described in detail below for reference. The Single-Station EMVNA (a/k/a S-EMVNA) shares similar installation configurations and performs the same functions as an I-EMVNA, but is not hard-wired system-integrated and is not synchronized with other visual notification appliances in a building, area, space specific zones or sub-zones. Deployed with common single station smoke alarms, the Single-Station EMVNA is pending listing by Intertek (ETL) and conforms to *UL 985; Household Fire Warning System Units*. This device is 9v battery powered, and is an alarm-sound-activated free-standing household fire warning device.

Signaling Devices for the Hearing Impaired, UL 1971

Scope: 1.1 These requirements cover emergency-signaling devices for the hearing impaired. The devices and/or systems covered by this standard are suitable for use in a controlled environment, or in an uncontrolled environment as indicated in the product marking. These devices are to be used in accordance with the requirements of the National Fire Alarm Code, NFPA 72. [continued]

Household Fire Warning System Units; UL 985

Scope: 1.1 These requirements cover household fire warning system control units intended to be installed in accordance with the National Fire Alarm Code, ANSI/NFPA 72, and the National Electrical Code, ANSI/NFPA 70. [continued]

Definition of the "Integrated-Egress Marking Visible Notification Appliance": The Integrated Egress Marking Visible Notification Appliance ("EMVNA" or EMVNA") is a technologically advanced fire-alarm system integrated visible notification appliance designed for the deaf and hard of hearing. The EMVNA provides visible stimuli and information to users, emergency response personnel, and occupants which is targeted in the general building, area, or space, (or only specific parts of a building, area, or space designated in specific zones and sub-zones). The EMVNA provides floor to top-of-jamb illumination or low-level illumination in a notification-zone-synchronized linear configuration and emits a strobed emergency light message of appropriate intensity to occupants, users and emergency response personnel in order: (i) to initiate emergency action; and, (ii) to demark the exits and/or pre-determined paths of egress; and, (iii) to direct users, emergency response personnel, and occupants to such exits or along such pre-determined paths of egress in buildings or outdoors for evacuation or relocation purposes.

As a "*Supplementary Visible Notification Method" [pursuant to NFPA 72; 18.7, 18.7.1 and 18.7.2]*[4] the EMVNA is a public mode visible signaling device for the *Deaf and Hard of Hearing*. The EMVNA (i) augments other visible and audible signals when they are activated in a fire, (ii) complies with its marked rated performance and, (iii) in its primary installation configuration, is installed around the periphery of and along the flanking lateral areas of an exit door with portions of its components falling below 80 in. above the floor, to provide deaf and hard of hearing occupants of a building with a much needed public mode supplementary visible notification method of alert to denote exits and to direct deaf and hard of hearing occupants toward the closest exit in a fire or other emergency. The EMVNA meets or exceeds the requirements of the *"Underwriter's Laboratories; UL 1971 Standard- Signaling Devices for the Hearing Impaired"*[5] and complies with NFPA 72- National Fire and Signaling Code; Chapter 1.5, *Equivalency* and Chapter 18.7, *Supplementary Visible Signaling Method*.

The EMVNA is a visible notification appliance for the deaf and hard of hearing (hearing impaired) similar to other notification appliances that meet the required criteria for such a designation. However, the EMVNA is equipped with a linear form of luminaries as opposed to point source and are installed along the path of egress or at the terminations of egress pathways within a space, area or building. EMVNAs provide a wider variety of functionality and effectiveness than conventional visible notification appliances in that illumination extends well below the spaces obscured by the smoke plume. EMVNAs are synchronized with other visible notification appliances in the connected zone and flash at the specified 1Hz rate while delivering a color and luminosity specifically designed for its low-level location and utility. The EMVNAs light intensity and color is specifically designed to be "reasonably bright – but not blindingly so"– and easy for the human eye to see and brain to recognize.

Functionality & Purpose of the EMVNA for the Deaf and Hard of Hearing

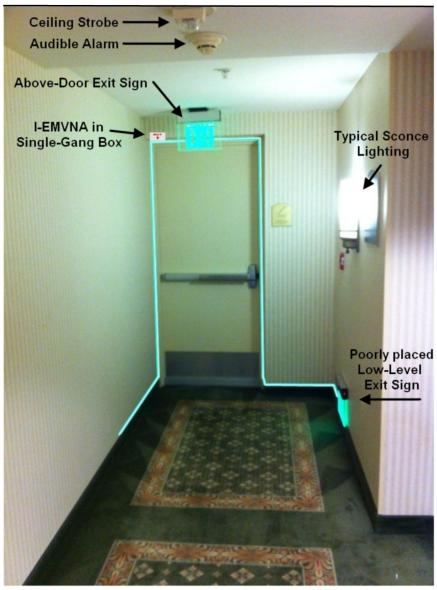
The Egress Marking Visible Notification Appliance operates as a public mode supplementary visible notification method for the hearing impaired. It is designed to utilize a fire alarm system-synchronized linear stroboscopic luminary configuration situated around the periphery of an exit door and/or, in alternative configurations, along the path of egress, to deliver a code-compliant emergency alarm light message: (i) to **"alert"** (notify) occupants of the building or premises to the existence of a fire or other emergency condition when the fire alarm or other system in the building is activated; and, (ii) to **"demark"** specific predetermined egress path or termination, such as an exit doorway, and/or other points or along a path of egress with bright flashing light; and, (iii) to **"direct"** occupants to the exit and out of the building. In comparison to other visible notification appliances commonly used in America, the EMVNA is a method, device, or appliance of equivalent

or superior quality, effectiveness, and safety over those prescribed by code. The EMVNA's obvious ability to alert, demark and direct occupants through simultaneously delivering superior visible notification alert functionality in addition to simultaneously providing superior egress path and/or exit demarcation and direction of occupants in a format, method and physical location which delivers higher overall *effectiveness* than combinations of *other conventional visible notification devices and egress path or exit marking devices.* The EMVNA is the exact type of method, device and/or appliance that National Fire Codes expressly anticipate to increase safety and reduce loss of life in fire.

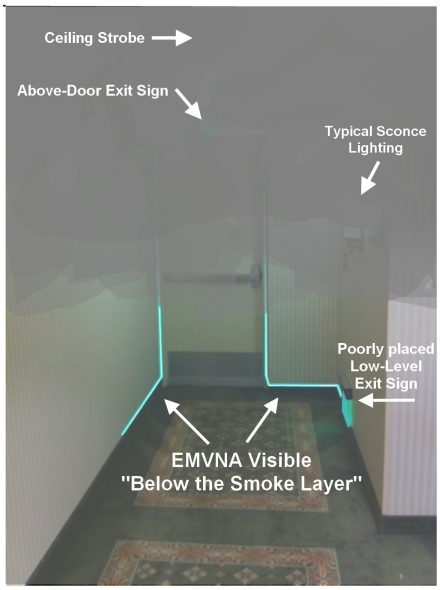
The EMVNA provides a distinctive optimally positioned visual light signal at all points (high and low) around an exit door and at low levels in other configurations which is readily visible from any direction making the egress path or exit apparent to the occupants. As smoke fills a space and obscures light from other visual notification appliances and exit signage, the EMVNA uniquely delivers light signals below the smoke layer to occupants providing floor-level identification of the egress path and/or termination of the exit. This unique attribute permits the EMVNA to provide hearing impaired occupants of the structure with the longest possible period of time to effectively locate an exit path or termination below the smoke layer. This enhanced efficacy of path marking and exit marking combines the efficacy of a moderately intense flashing emergency light signal with high and low-level exit demarcation in an easily deployed, low-cost format.

On Fire Code & Accessibility Laws

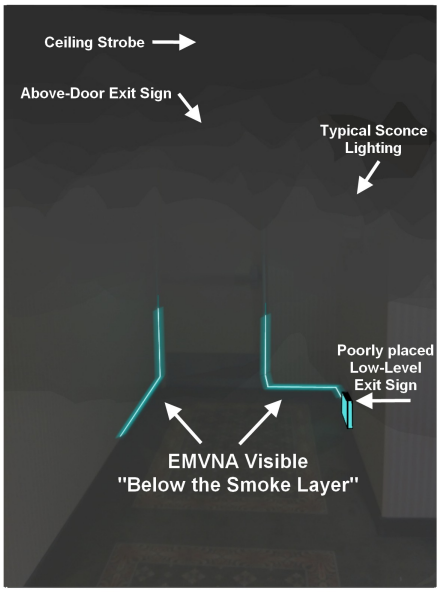
Why the EMVNA is Important for the Deaf and Hard-of-Hearing



Typical End-of-Corridor Hotel Exit
(normal operating conditions no fire/smoke)



Typical End-of-Corridor Hotel Exit
during fire/smoke event
(conceptual graphic to indicate the concept of the EMVNA)



Typical End-of-Corridor Hotel Exit
during fire/smoke event
(real-life experience based representation of conditions mere 'seconds' into the fire)

The EMVNA provides an advancement in technology that levels the playing field for the deaf and hard of hearing and delivers an *equal opportunity* to the deaf and hard of hearing that are evacuating a space or building in fire *during the critical life-threatening moments of the fire crisis* when the very nature of their disability requires it most and their hearing co-occupant counterparts have an advantage; when thick black smoke from a fire quickly renders the high-on-the-wall single-point-of-light conventional or traditional emergency strobe lights and exit signs ineffectual or useless. Its combined abilities to alert, demark and direct as a visual notification appliance lends this technology a unique added effectiveness and usefulness that specifically benefits the deaf and hard of hearing in facilities where conventional notification appliances are required. Its intentional design of physical placement of light in a more useful location, type of light, light format and overall installation configuration, allows it to serve in a new more effective way that is particularly useful to this group in particular.

Consider what the Deaf or Hard of Hearing Occupant Experiences in a Fire

As thick black smoke pours into a building and accumulates, generally from the ceiling down in a fire, conventional emergency strobe lights, given their code-required installation configurations (i.e. typically above 80 inches high on the wall or on the ceiling) and the fact that they emit or broadcast their light emission from a single point location up high, place them at an elevation most quickly affected by the smoke. This design and placement limits their ability to effectively spread light over multiple points in the area in thick smoke and can render them useless to occupants for their intended purpose at the exact point in time when evacuating occupant's dependence on them is highest. This inherent placement, design and functional fallibility is glaringly highlighted when one considers the the very nature and conditions of the emergency condition which they are intended to serve (i.e. a fire) and the specific times when they are designed to perform for the occupants of a building on fire (i.e. during the fire).

In a fire, assuming that both hearing and non-hearing occupants have full use of their vision, it is reasonably conceivable that a deaf or hard of hearing occupant attempting to evacuate or relocate to safety in the building, just like his/her fellow hearing occupants, early on in the crisis, can readily see alarmed visible notification appliances when they are emitting their flashing light broadcast. But what happens after those lights are occluded by smoke? As a result of thick black smoke quickly accumulating in the space as time passes and the fire grows, conventional traditional visible notification appliances and above-door exit signage can be quickly rendered ineffective as they become shrouded in the smoke and their light message becomes occluded. At this point, the deaf and hard of hearing person's risk is increased in comparison to the hearing population in the same building or space, because the deaf person has lost a tool in the smoke occluded appliances and the hearing person's still has the ability to find a backup notifier in the “audible” appliances in the space, in the voices of rescue personnel or other occupants providing directions or audible help, or if present, directional sounders in the building during these moments. At this time, during the fire event, when currently used visible notification appliances and exit signage have disappeared from view, the space darkens to pitch black; subjecting the deaf person to increased vulnerability and decreased probability of safe escape.

It is in these even more critical life-threatening moments “during fire event when evacuation or relocation is underway” where the fire is growing and the resulting smoke has increased, that the “hearing impaired” person, due to the very nature of his/her disability, is left to find his/her own way out; as he/she cannot hear or rely on the audible appliances or emergency personnel's (or other) voices or directional sounders still broadcasting their alerts or directions. This biased uneven playing field for the deaf person would be particularly apparent in a building or facility where directional sounder technology were in use during the fire event.

So, in an effort to do good, in requiring both audible and visible alarms in many settings through law, these laws, through no fault of the enforcing AHJ, have inadvertently created a point in time where the deaf or hard of hearing individual is placed at a disadvantage. The current laws have inadvertently not addressed “*the exact point in time when such devices will be relied upon or consider whom would be relying on them at those particular critical points in time*”. During this fire event, while the fire is “doubling in size every 30 seconds”, (*NFPA*), the possibilities of the way the fire event plays out for the deaf and hard of hearing (versus his hearing co-occupants) predictably increases risk for the deaf person and lessens it for the hearing person.

Consideration of this specific point in time (during the fire event) allows us to analyze its importance to those whom cannot hear. Interestingly, this point in time (i.e. during a fire event) is important enough to mandate the absolute requirement by lawmakers of the installation and use of notification appliances in general (NFPA 72 and others), but, for the deaf and hard of hearing, does not follow through to truly envision or address what commonly happens in those very moments for the deaf person when the fire event is underway and the building or space is quickly filling with thick black smoke. It is at this particular and foreseeable point in time that, perhaps accidentally, an *inequity of opportunity* to be notified by the notification system or further notified and directed by rescue personnel or others audibly is created. The EMVNA technology provides the AHJ with a means of addressing this specific timing issue for the deaf or hard of hearing population of the structure and allowing the AHJ to provide an equivalent means of alert and direction for the deaf “at all points in time” during the fire.

Introduction of the EMVNA into the fire scene can lower the risk for the deaf and hard of hearing in these critical moments by providing them with an auxiliary method and device that de-risks the event's outcome for them and which, in equal measure, bridges over the advantage that hearing persons innately enjoy because they can hear

during the fire event. It is in these moments where the EMVNA finds a sound and solid foundational home as a visible notification appliance for deaf and hard of hearing persons. In these moments, when hearing occupants have a varied array of alternative alarm means (i.e. horn-strobes, horns, directional sounders, chimes, bells, rescue personnel voices, etc.), the deaf and hard of hearing person is left to fend for himself. The EMVNA can equalize this inequity gap by providing *equal opportunity and benefit* to those that suffer hearing impairments during these particular critical periods of time during the fire event when low-to-floor-level visual notification is necessary due to the quickly descending smoke layer and exit identification is critical to have in these lower areas where one can still more reasonably see at a distance under the smoke layer.

Moreover, despite its design for the deaf and hard of hearing, the EMVNA importantly also provides this added alerting and egress path marking benefits and utility to every "sighted" occupant in the building in an unbiased way regardless of their disability or lack thereof.

EMVNAs and the NFPA 72 National Fire Alarm and Signaling Code

The National Fire Protection Association's NFPA 72 (*National Fire Alarm & Signaling Code*) encourages and makes special provisions for the allowance of new technologies, like the EMVNA, when they arise and come forth to market. As an example of this, *NFPA's 72, Chapter 1, Section 1.5,* specifically cites:

Chapter 1; Section 1.5 Equivalency.

1.5.1 Nothing in this Code shall prevent the use of systems, methods, devices, or appliances of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this Code.[6]

In reference to NFPA 72's Section 1.5 *Equivalency*, the EMVNA is unmistakably a method, device, or appliance of equivalent or superior quality, […] effectiveness, […], and safety over those prescribed by [the] Code. The EMVNA's obvious ability, in an equal or superior way, to alert, demark and direct through delivering visible notification, egress path marking and exit demarcation to hearing impaired occupants (and others) in a way and physical location which is obviously delivered in an equal or superior qualitative form, higher overall effectiveness which increases safety over others prescribed by [the] Code, marks the EMVNA as the exact type of method, device and/or appliance which the Code expressly anticipates and seeks out for embrace.

Chapter 18; Sections 18.7, 18.7.1 and 18.7.2 "Supplementary Visible Signaling Method."
Pursuant to NFPA 72, a supplementary visible notification appliance must meet the following criteria:

> *18.7* ***Supplementary Visible Notification Method.*** *A supplementary visible notification appliance shall be intended to augment an audible or visible signal.*
>
> > *18.7.1 A supplementary visible notification appliance shall comply with its marked rated performance.*
> >
> > *18.7.2 Supplementary visible notification appliances shall be permitted to be located less than 80 in. (2.03 m) above the floor.*[7]

In reference to *NFPA 72's Section 18.7* above, an Integrated form of the Egress Marking Visible Notification Appliance for the Hearing Impaired ("EMVNA") is a technologically advanced Supplementary Visible Notification Appliance for the Hearing Impaired which (i) *augments other visible and audible signals* when they are activated in a fire, (ii) *performs to its marked rated performance,* and, (iii) in its primary configuration, *is installed* around the periphery of and along the flanking lateral areas of an exit door with portions of its components falling *below 80 in. above the floor.*

It is as if Sections 1.5 and 18.7 were specifically written for the EMVNA. The EMVNA appliance's superior effectiveness and resulting improved safety methods, being equal or superior to other conventional Code prescribed appliance's methods in its synchronized signaling/alerting functionality, and, the fact that the EMVNA is superior to conventional Code prescribed appliance's when considering its capabilities to effectively alert, demark and direct occupants in a fire, grants the Authority Having Jurisdiction (AHJ) a foundation to include the EMVNA in his/her consideration of the specific visual signaling requirements for any given space or occupancy type wherein the AHJ believes the device's addition an improvement to the overall safety of the building, area or space. This superior efficacy is especially true when it comes to an AHJ's concern for the safety of the deaf and hard of hearing population.

EMVNA's and America's Accessibility Laws

NFPA's Codes and other federal and state laws strongly support one another in that they all dove-tail to support new technologies' introduction when such innovations can specifically assist disabled persons to enjoy equal access to buildings and spaces. Many of these laws actually go even further than NFPA 72 in empowering fire authority and other AHJ's to require the EMVNA's use.

A few of the Federal Accessibility Laws that should be considered:

Americans with Disabilities Act of 1990, et seq (ADA)
Americans with Disabilities Act Accessibility Guidelines (ADAAG)
Fair Housing Amendment Act (FHA)
Fair Housing Accessibility Guidelines (FHAG)
Uniform Federal Accessibility Standards (UFAS)

Along with rules, regulations and/or codes promulgated by NFPA, ICC and other building, fire safety and building operations laws that arise and which can be legally adopted and applicable to a building design and/or its operations are the Federal (and State) requirements applicable to such buildings. The Americans with Disabilities Act (ADA) and the Fair Housing Act (FHA) are two of these federal regulations that affect building construction and operations as it relates to "*accessibility for persons with disabilities"*[8]. In many buildings, these federal laws and their requirements impact exit design, fire alarm system design and many other facets of the building's construction and operations.

Currently, NFPA and International Code Council (ICC) codes address accessibility provisions for people with disabilities and their documents are modeled on and, generally, harmonized with the requirements of the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and the Fair Housing Accessibility Guidelines (FHAG). The ADAAG and FHAG guidelines prescribe certain fundamental underpinnings basis of, descriptions and processes of the accessibility rules and regulations. It is important to recognize however that; compliance with NFPA or ICC documents, however, does not constitute compliance with federal requirements and designers, managers, tenants and owners are guided to review and understand both ADAAG and FHAG requirements as they may apply to exit design, refuge area design and fire alarm system design. It is also important to note that, in the case of public service facilities (as defined in Title II of the ADA) "*an alternative design standard can be applied in lieu of the ADAAG"*[9]. This standard is referred to as the Uniform Federal Accessibility Standards (UFAS).

An Analysis of the EMVNA in Accessibility law

The EMVNA is designed specifically with the Americans with Disabilities Act of 1990, et seq, particularly Title I and Title III, in mind. The device's availability and designed ease of installation permits the quick deployment of the technology as "*a reasonable accommodation*"[10] under Title I—Employment of the ADA [*See 42 U.S.C. §§ 12111–12117*] and the costs associated with its acquisition and installation avail it to the deaf or hard of hearing person's need as a reasonably affordable solution under Title III—Public accommodations (and commercial facilities), [*See 42 U.S.C. §§ 12181–12189*], where the statutory definition of "*readily achievable"*[11], which calls for a balancing test between the cost of the proposed "fix" and the wherewithal of the business and/or owners of the business.

When considering the presence of deaf and hard of hearing persons in public accommodation settings, employers, businesses, property owners, landlords and property managers subscribing to a "*Best Management Practices*" approach to operating their businesses and facilities when considering safety for the disabled can also apply the above mentality to head-off an *action* or preempt a *request for modification* by a deaf or hard of hearing tenant or employee. *"The [ADA] applies to all facilities, including both facilities built before and after 1990. As a necessary step to a program access plan to provide accessibility under the ADA, state and local government, public entities or agencies are required to perform self-evaluations of their current facilities, relative the accessibility requirements of the ADA. The agencies are then required to develop a Program Access Plan, which can be called a Transition Plan, to address any deficiencies."*[12] So, all facilities are required to address these specific ongoing concerns for the disabled people that might visit or frequent them. This should be undertaken voluntarily to stay ahead of the curve and ahead of the possibility of the AHJ's issuance of a mandate or citation or, worse yet, a civil action resulting from non-compliance. By installing the EMVNA, the facility operator or employer can readily achieve an advanced state of fire safety by including the *reasonably accommodatable* and *readily achievable* EMVNA device in his/her facility for all deaf and hard of hearing persons whom might

frequent the building or space whether regularly or intermittently; many of whom might occupy it as a rent-paying tenants. The EMVNA's installation and use therein can undoubtedly be reasonably accommodated and achieved to provide a low cost safety upgrade that decreases the deaf and hard of hearing's chances of injury or death in the event of a fire while occupying such premises.

Considering the low cost (affordability) relative to marginal safety provided

Providing this form of signaling is critical to the deaf and hard of hearing occupants or tenants, whom, by virtue of the nature of their disability, cannot respond to rescue personnel's voices, horns, bells or directional sounders in an forced evacuation of the building in a fire or other emergency. Given the relative low cost of incorporating the technology into any given facility or residence, what might be *readily achievable* for a sophisticated and financially capable corporation is, in fact, also readily achievable for a small or local business in the case of the EMVNA. The marginal enhancement of overall safety and resulting lowering of the risk of loss of life and/or injury for the deaf or hard of hearing where the EMVNA is installed and in use is immeasurable when compared to its relative nominal acquisition cost. Saving just one deaf or disabled occupant's life or providing the means for just one deaf or disabled person's avoidance of injury is, by any standard, a worthy benefit in comparison to the minimal expense of deployment of the technology.

When considering the EMVNA, one should recognize that Title III of the Americans with Disabilities Act, 42 U.S.C. Sections 12182, 12183, (ADA) provides people with disabilities with the rights to *equal access* to *public accommodations*, *commercial facilities and other qualifying ADA protected facilities*. For deaf and hard of hearing people, Title III and its regulative authority demands the removal *communication barriers*[13] in these settings also.

The ADA covers a wide range of places. In fact, Title III of the Act covers places, such as hotels, theaters, restaurants, doctors' and lawyers' offices, banks, insurance agencies, retail stores, museums, parks, libraries, day care centers and private schools. All of these *public accommodations, commercial facilities and other qualifying ADA protected facilities* are required to provide auxiliary aids and services to ensure effective communication with deaf and hard of hearing people. The ADA also requires the removal of structural communication barriers that are in existing facilities, *by the installation of flashing alarm systems*, permanent signage, and adequate sound buffers. In this light, one must ask, "is there a more important time, in all of time, than those moments during a fire to insure that the deaf, hard of hearing and other disabled persons are provided with *auxiliary aids* and/or innovative means to of enhanced communication to lower barriers for them to achieve an equal benefit from the facility's emergency systems?

Re: Auxiliary Aids (in this case, EMVNAs)

The U.S. Department of Justice regulation to Title III of the ADA, [28 C.F.R. Part 36, and the Analysis thereto, 56 Fed. Reg. 35544 - 35691 (July 26, 1991)], explain in detail the requirements of this title. *Public accommodations are required to provide auxiliary aids when such are necessary to enable a person with disabilities to benefit from their services*:

> *"A public accommodation shall furnish appropriate auxiliary aids and services where necessary to ensure effective communication with individuals with disabilities."*[14]

Under 8 C.F.R. Section 36.303(c)*.; "A public accommodation may avoid provision of an auxiliary aid* ***only*** *if it can demonstrate that provision of such would fundamentally alter the nature of the service, or would constitute an undue burden or expense"*[15] [reference the EMVNA's affordability by any standards and its ease of deployment (installation)]. If the public accommodation is able to demonstrate that there is a fundamental alteration or an undue burden in the provision of a particular auxiliary aid it must, however, be prepared to provide an alternative auxiliary aid, where one exists.

Under 28 C.F.R. Section 36.303(f)*.;* A comprehensive list of auxiliary aids and services required by the ADA is set forth in this regulation, and includes, for deaf and hard of hearing individuals:

> *qualified interpreters, notetakers, computer-aided transcription services, written materials, telephone handset amplifiers, assistive listening devices, assistive listening systems, telephones compatible with hearing aids, closed caption decoders, open and closed captioning, telecommunication devices for deaf persons (TDD'), videotext displays, <u>or other effective methods of making aurally delivered materials available to individuals with hearing impairments.</u>*[16]

Where an unequal benefit exists, a remedy (auxiliary aid) may be called for to adjust the equation to level the playing field for the disabled person. An EMVNA, in this case may be required; especially if its installation had been submitted to the landlord employer (or facility landlord by the employer/tenant) via a "*request for modification*" by a deaf or hard of hearing person to rectify the inequity. The installation might be required in the above scenario if the EMVNA's acquisition and installation was both, "*reasonably accommodatable" and "readily achievable",* provided it meets the "balancing test".

The entire realm of accessibility law is littered with references to the "requirement" of providing additional assistance through auxiliary aids to disabled persons in every setting. Additional support for this position is also provided in other aspects of ADA, ADAAG and FHAG is outline below:

Additionally Consider:

> ***ADA: Sec. 12182. Prohibition of discrimination by public accommodations***
> *(A) Discrimination. For purposes of subsection (a) of this section, discrimination includes*
> (2) Specific prohibitions:
> *"...(iii) a failure to take such steps as may be necessary to ensure that no individual with a disability is excluded, denied services, segregated or otherwise treated differently than other individuals because of the absence of auxiliary aids and services, unless the entity can demonstrate that taking such steps would fundamentally alter the nature of the good, service, facility, privilege, advantage, or accommodation being offered or would result in an undue burden; ..."*[17]

And, Additionally Consider:

> ***ADAAG 103; Equivalent Facilitation***
> *This section acknowledges that nothing in these requirements prevents the use of designs, products, or technologies as alternatives to those prescribed, provided that the alternatives result in substantially equivalent or greater accessibility and usability.*[18]

This well established concept is even extended to "dwelling units" in residential settings:

And, Additionally Consider:

> ***HUD/FHAG § 100.204 Reasonable accommodations.***
> *(a) It shall be unlawful for any person to refuse to make reasonable accommodations in rules, policies, practices, or services, when such accommodations may be necessary to afford a handicapped person equal opportunity to use and enjoy a dwelling unit, including public and common use areas.*[19]

In the case of the EMVNA, it is reasonably conceivable that, because: (i) the EMVNA is affordable to provide for nearly any sized business operation, landlord or property operator or tenant, and, (ii) the device is readily available in the marketplace, and, (iii) the deployment of or installation of the EMVNA would not unduly hinder the building owner's or employer's operation (temporarily or permanently) by or through acquiring and installing it into the space where a deaf or hard of hearing person frequented, resided or worked, a request by the deaf or hard of hearing tenant, or employee should most likely be perfunctorily accommodated in an abundance of caution for his/her safety should a fire event occur. Sometimes just "doing the right thing" is actually required by law; as it generally is in the case of this technology.

The EMVNA benefits extend to other high-risk groups also

Over and above the obvious need for the deaf and hard of hearing, other immediate beneficiaries of the the installation and use of EMVNA's are children, people with intellectual and other developmental disabilities, partially sighted, low-vision and some legally blind individuals, seniors, other occupants with known mobility difficulties, and/or those whom would likely suffer difficulties in safe evacuation as a result of long-term physician prescribed medication which might reasonably impair an occupant's ability to safely mobilize or evacuate if a forced evacuation of such building in a fire or other emergency were to arise. In the case of children, seniors and the with intellectual and other developmental disabilities, whom are in the highest risk categories for death and injury in fire [*NFPA*]; especially where the capability to read is called into in question. In these cases, it cannot be successfully argued that the EMVNA's intended form of visual notification which "also", through display of the non-textual universally recognized shape of the doorway (when installed at the exit), more holistically enhances these group's ability to be alerted, locate the exit and be directed to the exit .

On the Standards that Visible Notification Appliances are measured by

Even the standards, created and administered by the likes of Underwriter's Laboratories, that benchmark technologies like the EMVNA subordinate to this common theme among and across so many codes and laws that govern how we build in safety to our buildings, areas, spaces, zones and sub-zones. Below is an example where UL's Standard 1971 recognizes that the actual Code is empowered to allow new entrants to bring forward new technologies to the safety race and has made provisions for same in its articulation. The Standard, rewards this by expressly subordinating its scope to the law.

> **"1 Scope of the Standard**
> 1.1 These requirements cover emergency-signaling devices for the hearing impaired. The devices and/or systems covered by this standard are suitable for use in a controlled environment, or in an uncontrolled environment as indicated in the product marking. *These devices are to be used in accordance with the requirements of the National Fire Alarm Code, NFPA 72.* [1.1 revised November 29, 2002]"[20]

Underwriter's Laboratories writes the standards for specific devices and guidelines which are used as minimum standards metrics under and within the law. Each regulated device has a specific standard requirement and its particular place in law. The I-EMVNA falls into *UL 1971* which covers "*Signaling Devices for the Hearing Impaired*". This standard typically addresses Xenon point-source indirect-lighting strobes, but as an advancement in technology doesn't have to; provided the device in question meets NFPA 72's criteria. It is important to note here that, under ADA, which falls above all other laws in the hierarchy, advancements in technology for the hearing impaired expressly *may not be prohibited* and, under NFPA 72, "*nothing in the Code shall prevent the use equivalent or superior systems, methods, devices, or appliances…*"[21]. These dove-tailed combinations of two clear mandates in law construct a guaranteed consideration and opportunity for new technologies to enter the arena. Moreover, under the UL 1971 Standard, in Section 1.1, Scope, the Standard expressly refers to NFPA 72 in stating, "*These devices are to be used in accordance with the requirements of the National Fire Alarm Code, NFPA 72*". Having already met these NFPA requirements as (i) a "system, method, device, or appliance of equivalent or superior quality, […], effectiveness,[…, and safety over those prescribed by [the] Code", under Chapter 1.5 and (ii) as a Supplementary Visible Notification Method, under Chapter 18.7, the technology qualifies for testing and marking under the UL 1971.

Thusly, an allowance for new innovations has been provided as long as they comply with NFPA 72. With respect to this particular technology, NFPA 72 specifically and clearly recognizes and allows for the introduction of new technological advancements under Chapter 1.5, and even goes so far as to prohibit preventing its introduction to the service of the handicapped. Similarly, the Code acknowledges and expressly provides for "Supplemental Visual Notification Methods" (like this technology) in Chapter 18; written as though the section were conceived specifically for this technology.

In Summary; Code & Law Embrace the EMVNA

Fire Codes, Accessibility Laws, Standards and authorities that enforce them are all expressly aligned to embrace new technologies when they positively impact the disabled and/or can assist the disabled in the endeavor to provide "equal benefits". The ADA is, "An Act to establish a clear and comprehensive prohibition of discrimination on the basis of disability" (U.S. Equal Employment Opportunity Commission). Conceptually, the goal of these laws are to give thoughtful consideration to what a disabled person experiences in contrast to his or her non-disabled counterpart; not to coddle the disabled person, but, rather, to give him/her an "equal" experience in life. In the case of safety devices, this concept can be extended to suggest that the disabled person should garner equal consideration when the design of systems, procedures, layouts, etc. in a physical structure, space, area or building is contemplated for construction or operation. For the deaf and hard of hearing person, current fire alarm systems, while perfectly fine for the hearing, may have a fundamental, if not fatal, flaw inherent in their customary design and operation at specific points in time when conventional visible notification appliances can easily be rendered ineffective for their intended purpose due to their installation location requirements and the obvious uncontrollable nature of the way smoke fills any given building, area or space blocking the conventional appliance from view altogether. In these moments, the deaf man cannot hear rescue personnel's calls, other audible notifiers or any aurally oriented attempt at help.

At these "most critical life-threatening points in time," that is, during a fire or heavy smoke event crisis, it is more than reasonably conceivable that occupants, such as the deaf and hard of hearing, require assistance and/or auxiliary appliances or devices to level the playing field. In fact, an entire genre of law and a multi-billion dollar industry has been built on the fact that they are deserved of this consideration. In those moments (during the fire),

they cannot rely on traditional visible notification appliances the EMVNA solves a problem of inequity for the deaf or hard of hearing person by directly addressing their needs and placing a system integrated alert at a place and elevation that increases the chances at safely escaping. Other groups such as the partially sighted, low-vision and some legally blind individuals, people with intellectual and other developmental disabilities and others require an alternative form of notification to augment exiting notification systems to deliver an *equal benefit* of such system during the critical life-threatening moments of a fire. All facets of discrimination "at all reasonable critical points in time during a conceivably contemplated crisis" merit the thoughtful consideration and action on the building authority's and/or owner operator's behalf.

Whether it is the NFPA Fire Code, the International Building Code, the ADA, ADAAG, FHAG or any other authoritative entity or code, their legal doctrines all clearly dove-tail together to preserve and promote the marketplace's ability to deliver new technologies and advancements and innovation, like the EMVNA, into venues where it can serve to increase the level of safety for the disabled. The codes and standards that surround these legal concepts are expressly founded, in part, in embracing advancements in safety technology to bring about an equal benefit to those that need it most. These are well established principles and, as administered, adequately provide enforcing AHJ's with the authority to level that playing field for those that need the additional assistance in the endeavor. The law is clear and the authority to exercise the enforcement of it's spirit is similarly absolute.

Conclusions: Tied together, what this all means is that the integrated version of this technology in its anticipated form(s):

Tied together, what this all means is that the integrated version of this technology in its anticipated form(s) under codes and laws in place today which are designed to embrace innovation to solve problems for the disabled. We can discern from a study of these legal platforms that the EMVNA technology:

1. Is expressly anticipated under Accessibility Laws, Fire Codes and the Standards upon which technologies like it are governed, tested and certified;
2. In its "system-integrated" form, can and should be marked to UL 1971 as a "Signaling Devices for the Hearing Impaired";
3. In its "Single-Station" form, can and should be marked to UL 985 as a "Household Fire Warning System Unit";
4. Cannot, by law, be denied use as a "Supplemental Visible Notification Appliance for the Hearing Impaired" in public accommodations, commercial facilities and other qualifying ADA protected facilities;
5. Can, under law, be required/mandated for use by Authorities Having Jurisdiction whom oversee public accommodations, commercial facilities and other qualifying ADA protected facilities when making decisions with consideration of the deaf and hard of hearing;
6. Expressly, by law, may "not" be prohibited or prevented from use because it provides and equal opportunity for individuals with hearing impairments to have an equal benefit of escaping a fire; this given the advent of the technology itself and its superior efficacy vis-à-vis existing building fire alarm systems in public accommodation settings.

Given the introduction of the technology to level this playing field for the deaf person, its consideration must include and address the now glaring inherent limitations apparent in such existing fire alarm systems and their propensity to, in the absence of the EMVNA technology, result in placing the deaf person at a substantial disadvantage to his hearing co-occupants of the structure "during a fire event.".

Primary Forms of the EMVNA Technology

EMVNA devices are available in, both, single-station and system integrated forms. Either form provides the means of alerting occupants to the existence of an emergency condition, brightly demarking an exit or egress path and, directing occupants to the exits utilizing a flashing linear luminary. The typical preferred installation configurations are around an exit door or along pre-determined logical paths of egress from a building. EMVNA's utilize a proprietary formula of silicone based adhesive or mounting clips to mount the device's linear luminaries to the wall surface around a doorway.

Typical installation configurations indicate the linear luminary be installed across the top of the doorway horizontally, down the sides of the doorway vertically and on the flanking left and right sides of the doorway horizontally along the top of the baseboard or cov-base. This installation configuration provides the linear luminary a strong substrate on which to be affixed, gives it a protective setback from normal traffic through the doorway and allows it to remain reasonably inconspicuous in the standby condition. Unlike other visual

notification appliances that only alert building occupants to the existence of an emergency condition, the EMVNA distributes its visual message at and around an exit door and/or along a predetermined path of egress to alert occupants, demark the exit point or path of egress and "direct" people seeking to evacuate the premises or building to the exits or along a path of egress.

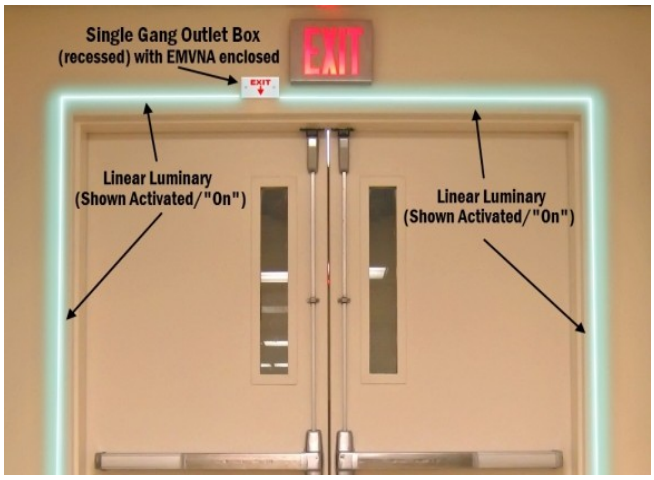
Single-Station Egress Marking Visible Notification Appliance (S-EMVNA):

Single Station EMVNAs can be used to "visually" alert deaf and hard of hearing individuals to the existence of a fire emergency and "visually" assist them in recognizing that audible smoke detector alarms in the space have been activated and broadcasting their emergency signals; when smoke sets-off a nearby smoke detector. When installed around an exit doorway, the S-EMVNA also demarks the exit location and is useful in directing occupants to that exit. While just as useful for any sighted or partially sighted occupant of a house or building when fire and smoke strike, the S-EMVNA has a powerfully distinctive and critical utility to those whom cannot hear commonplace smoke detector's alarms whose ordinarily aurally broadcasted alarm sounds are present, but completely ineffective for the deaf and hard of hearing person in the most critical moments early in a fire. This affordable and easy-to-install technology can be particularly useful to the hearing impaired in private residential settings where visible notification appliances are virtually non-existent in the United States and are not required by codes and ordinances.

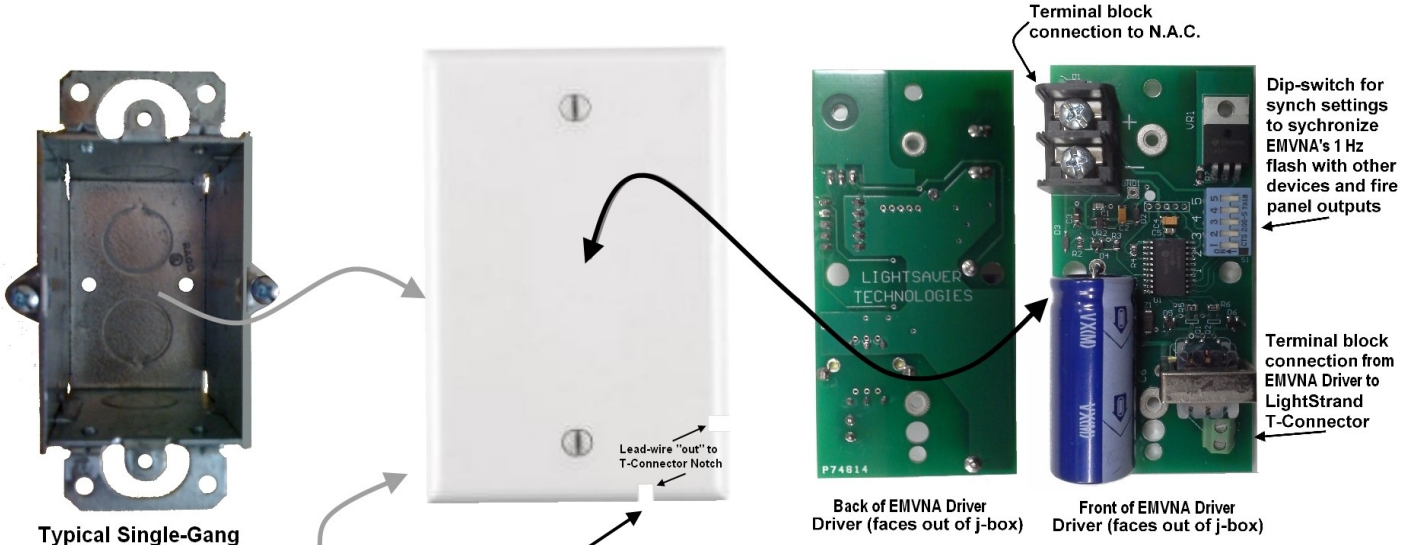
Generally, this version of the EMVNA technology's on-board microprocessor samples the ambient background audio in its space approximately every 2 seconds; "listening" for the tonal patterns and frequency values of the audible signal generated by code compliant smoke alarms. When these patterns and frequencies are identified, the S-EMVNA device's two standard-length 12' long linear luminaries are automatically triggered to flash in a 2Hz flash pattern; highlighting the universally recognized shape of the doorway, an emergency egress window or alternative pre-planned path of egress where installed.

S-EMVNAs are self-contained, sound-activated, 9v DC battery-powered and are activated when nearby single-station smoke alarms (and often, other audible fire alarms) are activated. The device is also designed to be triggered/activated by a firefighter P.A.S.S. Device operating within the listening radius of the S-EMVNA. The S-EMVNA's are not interconnected with other notification appliances and do not synchronize their light emissions with other visual notification appliances in a space or a building; like their Integrated EMVNA cousins which are designed for public accommodation, commercial and other ADA controlled settings.

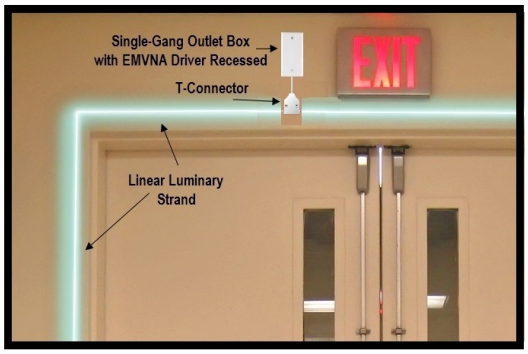
Integrated EMVNA's (I-EMVNA's): Integrated EMVNAs are designed to be integrated into building-wide fire alarm systems and their local signals are remotely initiated, either automatically from detectors in the system or manually from pull-stations spread throughout a facility when so initiated by the system's fire panel. These hard-wired EMVNAs are designed to be hard-wire connected to a building's fire alarm system's notification appliance circuitry (NAC) and are similarly configured to the system like other visual notification appliances like emergency strobes and horn-strobes. Most EMVNAs are designed to be installed/recessed into (or over) a single gang or double gang outlet box whose lettered cover plate can either denote the exit "here" with a down-arrow or which can denote which direction one should take to reach the nearest exit with a left-arrow, right-arrow or up-arrow as the specific location might command. Some I-EMVNAs are also fabricated in their own housing which can be mounted at any location. I-EMVNA devices can be field-calibrated to different light intensity settings and all I-EMVNAs flash in synchronization with the other visible notification appliances in the same room and/or field of view. Typical EMVNAs are calibrated by the manufacturer to flash at a 1Hz flash pattern or a pattern identical to the other visible notification appliances that it is synchronized with in the zone or field of vision.

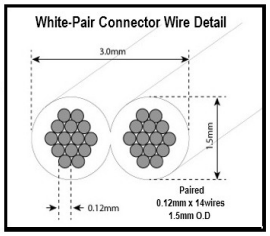


Egress Marking Visible Notification Appliance ("EMVNA")
Driver & Driver Housing / T-Connector / LightStrand
Graphic Overview and Specifications

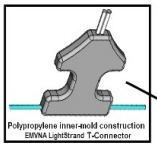


Alternative: Red single-gang nail on box used in the instal-lation of fire alarms and smoke detectors. The red color eases rough in identification of fire alarm circuits and smoke detectors.





2-wire lead connects LightSaver L-200Si EMVNA Driver™ with LightSaver T-Connector™ & LightStrand™ [Standard length: 32" (85 cm)]



LightSaver L-200Si EMVNA T-Connector™

Screws to surface mount to wall/surface

Around doorway/exit periphery and/or along top of baseboard

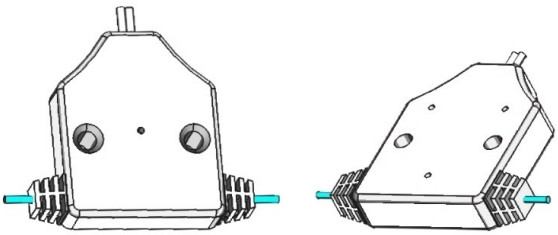
Around doorway/exit periphery and/or along top of baseboard

Lengths: 12' (370cm), 15' (460cm) or 18' (550cm)

Lengths: 12' (370cm), 15' (460cm) or 18' (550cm)

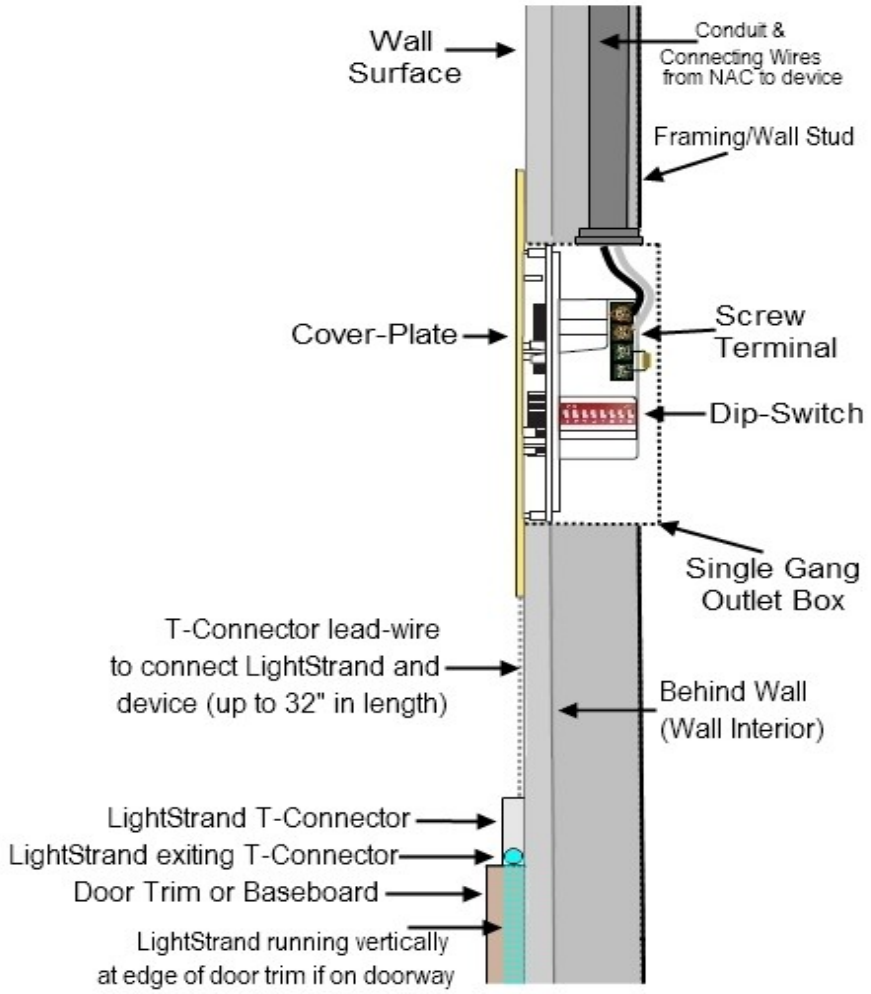
L-200Si-24' [12' (370 cm) each side / 24' (740 cm) total LightStrand length]
L-200Si-30' [15' (460 cm) each side / 30' (920 cm) total LightStrand length]
L-200Si-36' [18' (550 cm) each side / 36' (1480 cm) total LightStrand length]

LightSaver LightStrands are made with specially designed Lytec-Asia, Ltd. electroluminescent wire (elwire)
LightSaver Model CS113A1- Aqua with Super-Clear PVC Jacketing / 15P / UL94:V-0 rated for flammability (standard 1.3mm O.D.)



LIGHTSAVER™
TECHNOLOGIES, INC.

Egress-Marking Visible Notification Appliance ("EMVNA")
Side-View Section (not to exact scale)
Recessed in Single-Gang Outlet Box



The I-EMVNA device is automatically triggered with the NAC, like other notification appliances, to immediately light the periphery of an exit door and/or highlight the path of egress with it's two linear luminaries. The I-EMVNA luminaries are made available in a variety of linear luminary lengths; the most common being 12' long. Common linear luminary lengths are 12' (24 lineal feet of light per device), 15' (30 lineal feet of light per device) and 18' (36 lineal feet of light per device). These differing lengths for the I-EMVNA are designed to accommodate large or inordinately large doorways, double-door openings, doors with transoms overhead and/or doors with built-in side-light features.

This embodiment of the EMVNA operates on the integrated circuit's 24v DC low-voltage power source(s), is current limited and draws approximately 62.5mA (milliAmps) from the NAC circuitry power source for its operation. Generally, I-EMVNAs are integrated into building-wide fire alarm systems, are integrated--often zoned--alarms and are incorporated into the NAC similar in many ways to conventional fire alarm strobe light devices. The I-EMVNA can also operate on a 12v DC input and can also be hard-wired configured with and installed in a security alarm system or combo (fire and security combined) system.

Comparing the EMVNA, Strobes and Exit Marking Devices

	Conventional Emergency Strobes	Exit Signs	Low-Level Exit Signs	Exit Marking Visual Notification Appliance
Light Form Primary Utility and Type of Light	• • Alerts Occupants to Emergency Stroboscopically • • Provides *Indirect Lighting* • •	• • Demarks Exit Location using *Direct Lighting* • • Does not "alert" occupants to existence of emergency condition • •	• • Demarks Exit Location using *Direct Lighting* • • Does not "alert" occupants to existence of emergency condition • •	• • Alerts Occupants to Emergency Stroboscpically • • Demarks Exit Location Stroboscopically • • Directs Occupants to Exit Stroboscopically • • *Provides Direct & Indirect Lighting* • •
Device Location & Visibility relative to smoke filling its area or space	• • Typically mounted 80" to 96" A.F.F. (by code requirement) • • Situated where occlusive smoke accumulates first and quickly • •	• • Typically directly above the doorway • • Situated where occlusive smoke accumulates first and quickly • •	• • Typically installed 12"-18" AFF • • Situated where they are frequently kicked, carts, baggage and equipment run into them and where low-level debris, boxes, suitcases, carts and other commomly found items and/or other evacuating occupants can completely block their view from others downstream visually • •	• • Typical installation is around the "entire periphery" of a doorway "and" along the doorway's flanking side along the top of the baseboard or trim • • Light message is delivered both, up high "and" at low-level • • Luminary is protected by recess of surrounding door trim or frame hardware relief • •
Comparison of Attributes	• • High-intensity light • • Flash-blindness risk • • Alerts Stroboscopicly • • Indirect Lighting • • Small single Point of Light • • Located high on the wall or ceiling at 80" - 96" over F.F.E. where occlusive smoke accumulates first and quickly • • When interacting with smoke, can cause glare • •	Generally low in intensity • • Non-Stroboscopic Direct Lighting • • Typically 9"x12" Single Point of Light • • Located high on wall above doorway where occlusive smoke accumulates first and quickly • • Viewer's Angle of Approach has dramatic impact on effectiveness • • Requires ability to read to comprehend (children & visually impaired) • •	Low in intensity light • • Non-Stroboscopic Direct Lighting • • Viewer's Angle of Approach has dramatic impact on effectiveness • • Small in size • • Single Point of Light; difficult for partially sighted, low-vision and legally blind individuals to see • • Located where other evacuating occupants, baggage, carts and other obstructions can easily block them from view • • Requires ability to read to comprehend (children & visually impaired) • •	• • Medium intensity • • Low "flash-blindness" risk • • Alerts Stroboscopicly • • Light emission is viewable from any angle of approach • • Long linear luminary capabilities provide continuous length of 24' - 36' (lineal feet) of light of "multiple points of light" • • Light form shaped in the *universally recognized shape of the exit doorway* • • *Light color easiest for human eye to detect in contrasted settings* • •

A comparison and contrast of conventional visual notification appliances, EXIT signs and Egress Marking Visual Notification Appliance devices.

Visual Notification Devices, Exit Demarcation and the new EMVNA

Few material advancements in visual notification devices have occurred since their initial entry into the marketplace and their embrace by codes and laws. This segment of industry went from almost total obscurity to literally blowing up in the 1990's when the ADA codes were enacted. As enforcing authorities having jurisdiction (AHJ's) have developed an understanding of the current technology, notification appliances have emerged as an important, yet somewhat static and mundane, part of fire safety and building operations worldwide. And, as acceptance of their importance to fire safety has been incorporated into fire and building codes, reliance on them nearly everywhere we go today is almost a given. Generally, it was just a limited few pioneers whom were first to market with modern visible notification appliance products, mostly large-cap operations like Honeywell, GE, Siemens, Tyco and the like, have inherited the benefits of being founders of what now has evolved into a $30 to $40 Billion dollar domestic industry with sales approaching $170 billion annually worldwide.

Today, the EMVNA technology boldly interrupts this trend by delivering a much more effective appliance with versatility and functionality. Until the advent of the EMVNA, no other appliance has entered the market which successfully combines a system-integrated visible notification appliance with exit marking capabilities. Traditional code required system integrated visual notification appliances and other exit path marking device's typical placements and configurations, while immensely important as an acceptable means of visual notification to date, are materially less efficient than the EMVNA technology in delivering the visual notification message to occupants as smoke pours into an occupied space in a fire and fills the space from the ceiling down. The commonplace emergency strobes and exits signs, though important to preserve for a myriad of reasons, fall short in a number of ways as the graph below indicates.

Direct and Indirect Lighting

The EMVNA's light message, is both, a *direct and indirect visual alarm.* The EMVNA directly identifies a door as an exit, and also, at moderate non-blinding intensities of light, indirectly lights the areas proximate the appliance. This ambient, or indirect light emission also enhances certain disabled person's chances of locating the door-knob at the door or other information found at the door once the occupant reaches it. When smoke occludes other indirect point source light emissions from other conventionally installed emergency strobe lights, the EMVNA augments them by delivering the occupant a combined form of direct and indirect light along a path of egress or around the exit doorway. Conventional notification appliances, such as a strobe installed high on the wall or on the ceiling, which can easily be obscured from view by the accumulating thick black smoke, provide *indirect light* information with the hopes that its light emission is intense enough through the accumulating thick black smoke for a disabled person to locate the exit door and see the door-know when there as well. As the fire grows and more and more smoke accumulates, this indirect lighting functionality is diminished quickly and the moderate intensity ambient light provided by the EMVNA is certainly intense enough at the exit door location to light areas around the exit door itself.

Traditional strobes and their exit demarcating exit sign brethren are, by requirement (code/law) in most cases, placed overhead and high on a wall or on a ceiling. Understanding even the rudimentary facets of the physics of how smoke fills a space, i.e. from the ceiling down, one can quickly surmise and understand the marginal efficacy of the EMVNA over strobes and their exit marking counterparts. By virtue of their typical physical placement up high on a wall or on a ceiling under law and the fact that they are a "single point source of light" which can easily quickly be blocked by heavy smoke, the very nature of the crisis that they are designed to work in, fire and smoke, is their largest enemy when it comes to their efficacy. Given the EMVNA's design, mode of operation and the physical placement in areas which are not as susceptible to smoke's nature, the EMVNA places its light message "specifically" in the areas most needed during such the fire/smoke event. It can take mere seconds for the smoke to occlude the light being broadcast by these devices and thick black smoke accumulation, common in many structure fires today as a result of the highly plasticized materials used in and placed in any building, can quickly occlude the light message. As it relates to configuration as an egress path marker, When fire or other emergency conditions exist in a building where the device is integrated into such building's fire or other emergency notification system, the device.

About Smoke, and its nature.

As outlined in The Society of Fire Protection Engineer's *Smoke Production and Properties – SFPE Handbook of Fire Protection Engineering, "The smoke properties of primary interest to the fire community are light extinction, visibility, and detection."*[22] That is, the concerns of smoke with its ability to block light, lower visibility for evacuating occupants and being able to detect its presence (smoke detectors) are the key focus of how it can impact occupants when studied. Thick black smoke that often comes from fire in today's modern fires in a building is the single largest threat to occupants of a building in a fire. Statistics, across the board, suggest smoke is the culprit when it comes to tallying up and evaluating injury and death rates after a fire has occurred and much of this human damage is the result of the poisonous noxious gasses produced from so many plastics and other cyanide containing items found in nearly any setting today.

Example of smoke layer in a fire training exercise showing how a smoke layer can occlude all lighting from floor level visibility.

"Smoke and toxic gases kill more people than flames do.[...]. Thick black smoke quickly makes it completely dark and almost impossible to see around you, making it difficult to find your way,"[23] (*NFPA*). The EMVNA directly addresses the nature of smoke and deals with it on it's own terms with an innovative design of the placement, type and functionality of its visual light message required to assist occupants with hearing deficiencies and the hearing, alike.

EMVNAs beat smoke at its own game

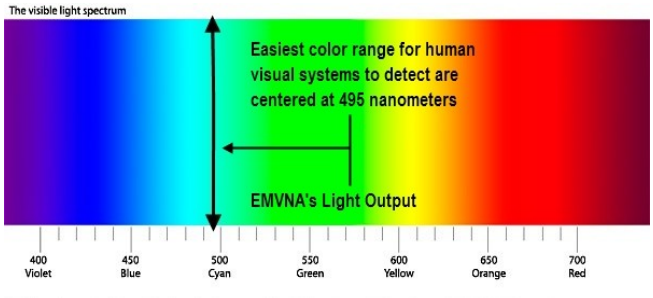
As outlined in The society of Fire Protection Engineer's *Smoke Production and Properties – SFPE Handbook of Fire Protection Engineering, "The smoke properties of primary interest to the fire community are light extinction, visibility, and detection."*[24] Interestingly, that is exactly what occupants caught in a building on fire are primarily concerned with. The EMVNA addresses two of these areas; light extinction and visibility, by providing an innovative way to beat smoke at its own game through the preservation of light outside of smoke's reach as it customarily fills any given space and through creating an alternative placement visible light in that space to alert, demark and direct. That is, the EMVNA addresses the specific concerns of smoke's ability to block light and lower visibility for evacuating occupants. Thick black smoke is the single largest threat to occupants of a building in a fire. Statistics, across the board, suggest smoke the culprit when it comes to evaluating injury and death rates after a fire has occurred. "Smoke and toxic gases kill more people than flames do.[...] Thick black smoke quickly makes it completely dark and almost impossible to see around you, making it difficult to find your way." (*NFPA*) In short, smoke can and does kill, and accepting its uncontrollable nature and working around its ability to choke out light is key.

With smoke as prolific as seen outside of this Chicago, IL high-rise fire, imagine what occupants are experiencing inside the building in these moments.

In a live burn down in northern California where approximately 80 firefighters in training exercises experienced the effects of the EMVNA in action, the EMVNA indicated that if a person can still breathe in a smoke filled room, the EMVNA was still visible at floor-level. The natural instinctual tendency for humans in fire to crouch low and underneath the smoke and below rapidly increasing temperatures at higher elevations in the room, commands that light, at those lower elevational levels is necessary to effectively alert, demark and direct occupants.

About Light Color

It is widely known that green based wavelengths (like the aqua-white light emitted by the EMVNA) are the easiest colors for human's visual systems to detect, especially in dark or darkening (contrasted) settings. At reasonable levels of illumination output in contrasted settings, such as that of the inside of a space or building during a fire when smoke is present, human visual systems just see light; and not the color of the light emitted. The EMVNA light emission, by design, provides the benefit of both an appropriate level of light intensity in a contrasted setting and an easy color for the human eye/brain to see/process.



Although the human eye can see over 10 million colors, the human eye is most sensitive to light emitted at a wavelength of 495 nm. That wavelength (495 nm) is precisely halfway between green and blue in the color spectrum; exactly where the EMVNA light color falls. This area of the color spectrum is most visible and easiest to see (for the human brain to process) because this color actually demands the least amount of energy by the human eye and brain to see and process, respectively, the light. This is especially true in a contrasted setting in a dark or darkening volume of space; such as in a building space filling with smoke.

In fact, consideration of human color visual sensitivity has led to drastic changes in the long-standing practice of painting emergency vehicles, such as fire trucks and ambulances, entirely red. Although the color (red) is historically intended for the vehicles to be easily seen and responded to, the wavelength distribution is not highly visible at low light levels and, actually, can appear nearly black in the evening or at night. The EMVNA light pulses conform to the code required UL Standards for flash rates as they flash in a variety of frequencies (model's flash rates vary depending on the model and use). The EMVNA combined pulse and color combination are uniquely designed to easily catch the attention of human eye in a crisis situation; particularly at night or in a dark or darkening volume of space where smoke, in a fire, is billowing in and quickly darkens the space by blocking out the existing conventional forms of light found in most buildings and homes or spaces today.

In fact, in recent news, NASA has contracted with one of its larger aerospace vendors to redevelop the International Space Station (ISS) to "*swap a fluorescent lighting panel with a solid-state lighting module (SSLM)*

containing LED's which produces a blue, whitish or red-colored light depending on the time" of day. By altering the color emitted by the SSLM, it is believed that the ISS environment can be modified to meet the then current needs of the crew and made more conducive to promoting alertness, or sleepiness. Insomnia, and its ramifications to the mission's crew, is a common problem in prolonged space flight.

The important note to take away from this is that, hues in the color of the EMVNA are believed, not only to be the easiest to see and process through the brain, but also promote "alertness". According to NASA, "*When these LED lights are colored blue, scientists believe that melanopsin - a pigment found in cells in the eye's retina which send nerve impulses to parts of the brain thought to make a person feel alert is stimulated. This blue light is also believed to suppress melatonin - a hormone made by the brain's pineal gland which makes a person feel sleepy when its levels rise in their blood."* Alternatively, "*by switching from blue to red light - via an intermediary white stage - this process should be reversed, encouraging a feeling of sleepiness."*[25]

Overall Effectiveness of the EMVNA vs. Common Emergency Strobes

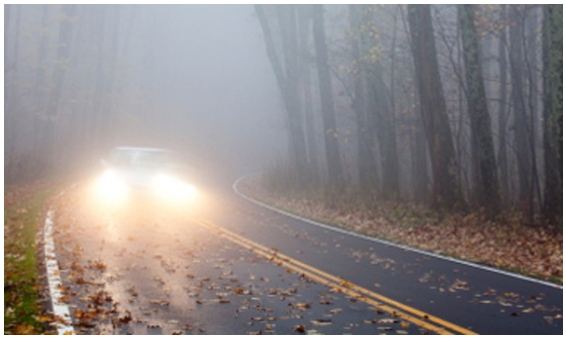
Common modern visible notification appliances in fire alarm systems utilize a single-point of light xenon lamp and lens to emit intense stroboscopic pulses of light into their indigenous areas as a form of "indirect" lighting to alert occupants and to assist occupants of a building in hopefully locating a path of egress and the exits to evacuate the space, area or building. These conventional strobes pump their light into a broad area of the room or space to light up the area for occupants to see enough of the space or area to navigate to an exit. In fire alarm systems, conventional traditionally recognized xenon emergency strobe lights are required to be installed on the ceiling or up high on the wall at or above 80" inches and below 96" in height unless the ceiling height of the room will not permit same. Alternatively, EMVNAs are installed all of the way around the periphery of an exit door and/or along a path of egress, up high and at lower levels, in a much more effective configuration when smoke from fire begets the extinction of light; an all too common phenomenon in fire. These appliances are also utilized in sleeping areas to "wake" slumbering occupants where higher intensity flashes, 177 candelas luminosity, are used to wake sleeping occupants.

In comparison to the EMVNA, traditionally recognized conventional emergency strobes do not "*directly*" identify the exit point or path of egress like the EMVNA. In contrast, The EMVNA, even though it is also a stroboscopic luminary designed to provide alerting functions and it and does deliver lower intensity ambient type lighting like strobes, is NOT intended to perform the same functions as traditional conventional emergency strobe lighting devices. It's moderate intensity light output and light color is specifically designed not to create flash blindness in evacuating occupants and to provide them with a a light color that is profoundly easy to see and process. The EMVNA is not intended to wake sleeping occupants and it is not intended to provide standard xenon strobe light intensities of light. Rather it is intended to alert, demark and direct occupants via an alternative location-of-light, intensity-appropriate and hue of color configuration designed to be "superior in its effectiveness and safety".

The problem with being a small single point of light which whose location is elevationally "high" in a room is that traditional emergency strobe's light emissions are often quickly occluded by the thickening smoke layer and, resultingly, are rendered completely ineffective. In contrast, the EMVNA is an improvement over the single point xenon lamp. Although the EMVNA shares a common goal with other visible notification appliances, as an advancement in this art designed for the hearing impaired, the EMVNA is different; it's designed to be. It does not share the same configuration of components, nor does it share the same locational installation placement that other visible notification appliances. It serves in an improved fashion to help the hearing impaired locate the egress path in the event of a fire crisis.

High intensity white-light glare

The EMVNA's moderate intensity and linear layout (around the exit doorway) diminishes, if not totally avoids the possibility of flashing glare in a smoke-filled setting. Everyone realizes the problem encountered while driving an automobile in foggy conditions at dusk or at night with high beam headlights on. The same glare problem is often experienced in smoke-filled buildings, spaces, areas and passageways both by evacuating or relocating occupants attempting to escape and also by rescue personnel entering the building to help them. It is the high intensity light of the emergency strobes that create this glare.



Smoke is nothing but "*a visible suspension of carbon or other particles in air, typically one emitted from a burning substance."*[26]. More specifically, according to Dr. George W. Mullholland, Head of the Smoke Dynamics Research Group in the Center for Fire Research at the National Bureau of Standards, "*smoke is, "the smoke aerosol or condensed phase component of the products of combustion."* His expert definition differs from the American Society for Testing and Materials (ASTM) definition of smoke, which includes the evolved gases as a part of the particulates. Regardless of how you define smoke, these particles, in a fire, are bouncing and convecting around in the air and they reflect and refract light waves from the lights emitting light in the smoky space. High intensity emergency strobes, which, by definition, are blasting their high intensity light pulses into the smoke during the fire. These white high intensity flashes are being reflected by all of the tiny particulates and droplets of smoke in the air at that time. High intensity light reflected delivers high intensity reflections.

The EMVNA decreases the chances of creating this condition overhead, but, even if it were to create some glare, that glare's intensity would, by definition, be in the shape of and at the location of the exit door. Also noteworthy is that the EMVNA's light color (hue) has actually been show in studies *"to be the most visible color (filter) in such settings."*[28]

Flash blindness and Emergency Strobes

Flash blindness caused by bleaching (oversaturation) of the retinal pigment of the eye when high intensity light, like that broadcast by emergency strobe lights, or camera flashes, is suddenly flashed into one's eyes. This effect can be even more dibilitating in dark settings (like in a fire) when the dark-adapted pupil of the eye is wide open, giving the flash blindness a greater effect and longer effects. This visual impairment during and following exposure to that light flash may last for a few seconds to a few minutes. As the pigment returns to normal, so too does sight. In daylight the eye's pupil constricts, thus reducing the amount of light entering after a flash.

As an example, in everyday life, the subject of even a flash photograph can be temporarily flash blinded. The bright light overwhelms the eye and only gradually fades. A bright spot or spots may be seen for many minutes. The military even uses this sensation offensively through the use of non-lethal weaponry such as flash grenades and laser dazzlers are used to blind the enemy and to give the attacker a resulting advantage. In general, high intensity flashes of light directly into ones eyes can blind the indivual temporarily and there are even some governmental studies and statistics that suggest that its effect could even result in temporary or permanent damage or sight impairment[29] (*NATO and the U.S. Department* of Defense). In some sporting event venues, and in the aviation industry, special precautions are taken to reduce an athlete's or pilot's, respectively, chances of flash blindness because it invariably distracts them and can put them and others at risk through instantaneously becoming temporarily blind and can hinder their ability to perform their duties.

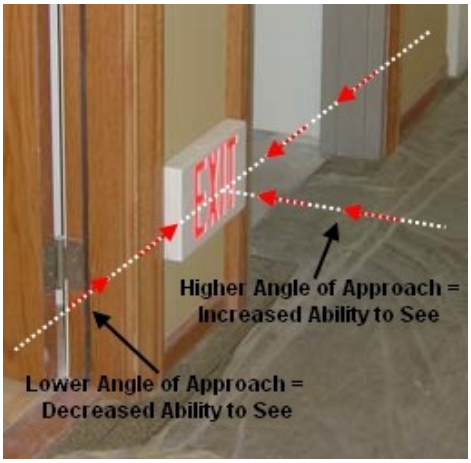
Because vision loss is sudden in flash blindness and it takes time to recover from it, flash blindness can be hazardous. And, in an emergency, such as a fire, this is the last thing an escaping occupant should be subject to during the crisis. The EMVNA is specifically designed to deliver a light emission color and intensity that diminishes the chances for occupants to suffer flash blindness when seeking the exits underneath the smoke in the then dark setting of a smoky fire. Because the EMVNA is designed to be situated at and around the doorway or along low-lying areas when demarking a path of egress, the occupants passing through such an exit porthole will be close to the light. The EMVNA design takes this into account by calibrating its light intensity to a "moderate" effective level of brightness. Its calculated moderation of brightness, specified color and installation configuration substantially diminish the possibilities of creating flash blindness in the individual as he/she passes by the light. This intelligent design is particularly important in time-starved critical moments of an evacuation or relocation of occupants.

The EMVNA & EXIT Signage

Exit signs, in all their forms, are not designed to "alert" occupants to the existence of an emergency condition and they typically have a much lower required intensity of light output (versus conventional xenon strobes) delivered to the viewer/occupant. They are also only effective if the occupant can read. If reliant solely on exit signs to locate an exit in a fire, exit sign's limitations can present difficulty in achieving the task. Locating the exit in smoke-filled spaces can be a dangerous proposition; especially for young children, partially sighted, low-vision and some legally blind persons, people with intellectual and other developmental disabilities, sight-impaired seniors, or others.

Above-door Exit signs: Above-door exit signs are not designed or configured to alert occupants; they are designed to denote the location of the closest emergency exit in case of fire or other emergency; hence, their location. Most public facilities (such as a building, aircraft or boat) are required to have permanently lit exit signs per fire, building, health or safety codes governing the location. Their primary purpose is to demark the exit-ways for occupants. They deliver non-stroboscopic low light intensity light emissions and are a typical +/- 12" x 9" single point of light. Their typical installation configuration, being installed high on a wall or at ceiling height "above" an exit doorway is, like it is with emergency strobe's typical physical placements, what presents the problem to their utility in fire and smoke; they can quickly be obscured from view as thick black smoke as it accumulates in a space. The EMVNA does not share these limitations.

Low-level EXIT signs: Low-level exit signs, having a similar non-stroboscopic single-point of light functionality, are installed peripheral to a doorway and lower on the wall (typically, 12"-18" AFF). These lights, many times smaller in size than their above-door relatives, also operate as a lower intensity and are also designed specifically to denote the location of the closest emergency exit in case of fire or other emergency. Being installed nearer the floor, these non-flashing single point of light luminaries are exposed to easily being damaged by the common carts, hand-trucks, being bumped by custodial equipment and the general wear of pedestrian traffic passing around and through the doorway where installed.

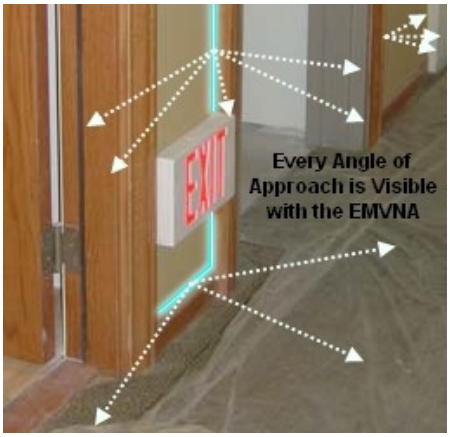


Lower angles of approach to the exit sign diminish its visibility and effectiveness.

These types of exit lights can be rendered ineffective when needed most because they can be easily obscured by carts, luggage, and any debris left in the path between the single low-intensity point of light and a would-be evacuee downstream from that single point of light; not to mention, in a fire, when evacuating or relocating occupants are crouched and crawling around underneath the layer of smoke, the occupants, themselves, can easily block their view from other occupants whom find themselves visually further downstream from the exit light location. The EMVNA does not share these limitations.

Visibility from certain angles

A little discussed, but very important fact to note about the limitation of low-level exit signs is that their placement, while low below below the accumulating smoke layer, is not readily visible from many angles of view when considering evacuee's angle of approach to the light. That is, unless an evacuee is approaching the low-level exit sign from dead-on or a few degrees either way from its 180° angle, the angle of view itself can severely diminish the sign's effectiveness. In many installed locations, the low-level exit sign simply cannot do its intended job, purely from the standpoint that evacuating or relocating occupants whom need to see it, simply cannot due to their angle of approach toward the sign. The EMVNA does not share this limitation.



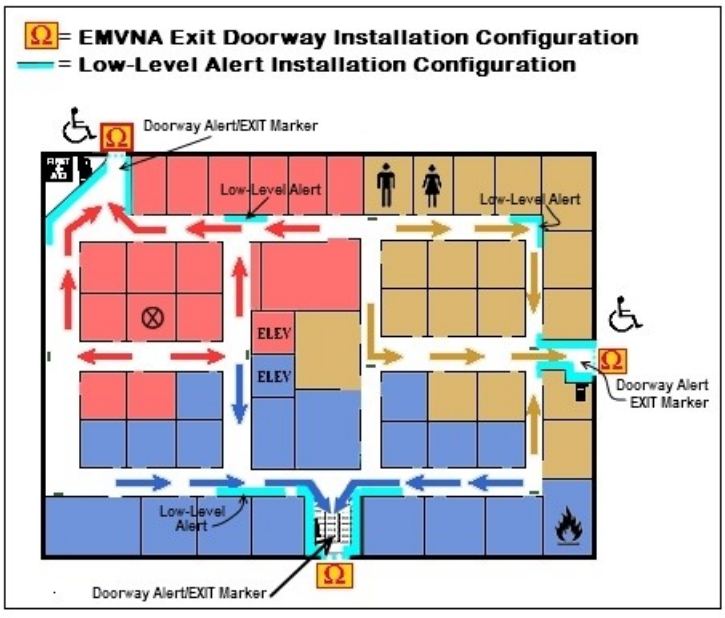
24' to 36' of light emissions are spread in every angle equally on both sides of the doorway and along the baseboard areas

In comparison to exit signs in all their forms, the EMVNA, delivers a superior format of denoting the location of the nearest exit. The EMVNA surpasses conventional exit sign's ability to demark the exit with its moderate-intensity light at high and low elevations on the wall, all of the way around the exit door and in areas flanking both sides of the exit doorway; *"visible from "every angle of approach*". And, one does not need to be able to read in order to understand the EMVNA's peripheral lighting message outlining the universally recognized shape of the exit doorway.

But, the EMVNA also takes two innovative steps forward in improvement in the art of demarking an exit. It (i) "alerts" occupants through its integration to the notification appliance circuitry in the building "and also" (ii) "directs" occupants to the exits through its stroboscopic light pattern emission and easily seen color by being located where needed most. By any standard, the EMVNA embodies a superior way, to **alert**, **demark** and **direct** through delivering visible notification and exit demarcation to occupants in a way and physical location which is obviously delivered in an equal or superior qualitative form, a higher overall effectiveness given common fire scene/event conditions, and increases safety over other typical conventional exit marking devices prescribed by code. This functionality marks the EMVNA as the exact type of method, device and/or appliance which common codes governing exit marking expressly anticipate and seek out.

Alternative Installation Configurations; the EMVNA's Versatility

Although the EMVNA's typical installation configuration is around the periphery of an exit doorway, it can provide superior alerting, demarcation and directional effectiveness, it is also a versatile notification appliance in a variety of alternative installation configurations. The EMVNA is, by design, easily fitted to about any reasonably sized doorway or emergency egress window where appropriate; regardless of its size. Its driver is designed to power its two, opposing, 12', 15' and 18' length light-strands giving it the capacity to provide combined total lengths of 24', 30' and 36' of linear stroboscopic light messaging to surround the entirety of normally sized doorways, doorways with a transom and window or fanlight above them, doorways with sidelights beside it and/or oversized or double-doors. However, the EMVNA's capabilities to deliver its stroboscopic linear form of light messaging aren't just limited to the doorway and its universally recognized shape. It can be installed in a variety of shapes with immense below-the-smoke-layer utility to effectively alert occupants as to where the path of egress lies relative to their current position in the building and achieving the safest, shortest and quickest path to exit.

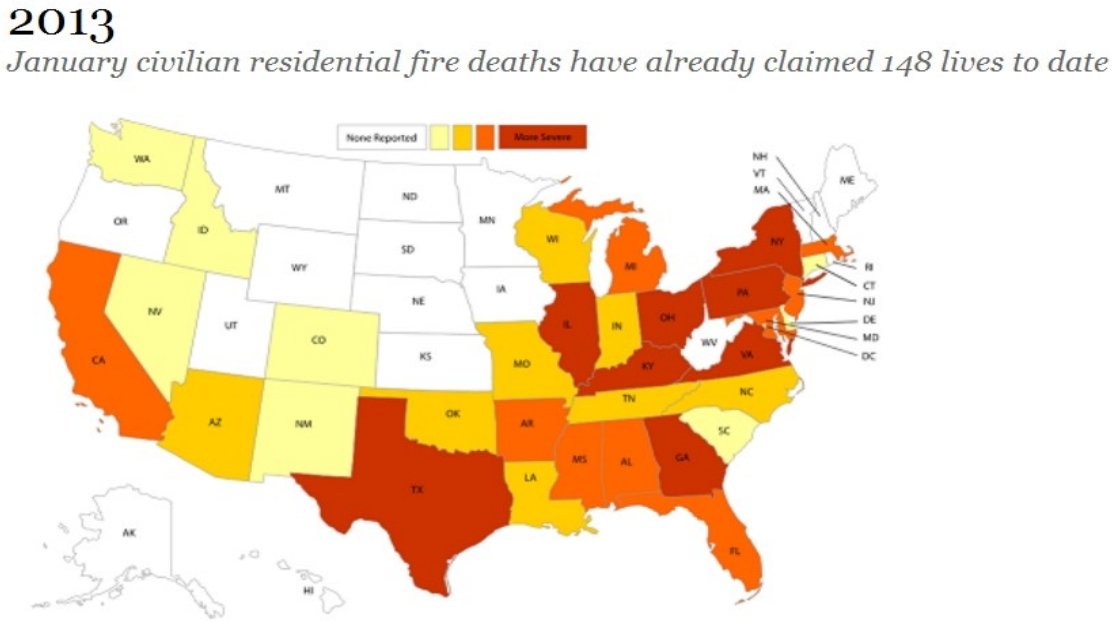


In larger buildings, spaces with complicated layouts or in intensely populated honey-combed spaces, areas or buildings where long meandering, winding or turning hallways act as the preferred paths of egress in a fire emergency, the EMVNA can be deployed as a low-level synchronized flashing NAC-integrated alerting device that leads an evacuating or relocating occupant to appropriate predetermined point and/or along a series of planned predetermined points that comprise a preferred path of egress.

As an example, consider the EMVNA's simple easily installation at low levels in/along a 90° turn or elbow in a hallway which leads the evacuees to a shorter or safer path of egress to relocation or evacuation. In the absence of this low-level alerting and path-marking light message in a space filled with thick black smoke, an occupant, given a choice of direction, might head in the exact opposite direction from the preferred path and could perhaps be heading into danger rather than to the nearest exit and away from danger. Most can imagine that choosing the appropriate path in the middle of a fire/smoke event in an unfamiliar space, area or building would be an easy mistake to make. It is easy to fathom that, in unfamiliar surroundings, especially during a fire crisis; a person may not have any understanding of which way to go to achieve the shortest and/or safest path to exit and safety given that they may have never been there before, the fact that panic commonly sets in during such an

event, and/or given the smoke may be already causing disorientation to the occupant at the time. In this case, at the a 90° turn, a T in the hallway or an elbow in the hallway, where an EMVNA is installed low (along the top of the baseboard) along the outer walls that comprise the corner, **with accompanying directional arrow signage on the wall at the same low-level location**, can permit the occupant to recognize that the corner is, in fact, an appropriate direction to go from his/her then current location in order to reach the nearest exit and then, when the point is reached, follow the directional arrow signage along the predetermined egress path. The EMVNA's capabilities to place light information where need most, such as discussed above, is unique to this type of visible notification appliance. Its format and new technological approach to alerting and directing at low levels simply cannot be duplicated by other visible notification appliances in the marketplace today.

"In the first 16 days of 2013 alone..... and longer fire department 'response times' might well be the culprit."



149 civilian fire fatalities reported by U.S. news media between January 1, 2013 and January 17, 2013.

"EMMITSBURG, Md. – While the winter months always bring a spike in home fires, the U.S. Fire Administration (USFA) says home fire deaths reported on by the news media are above those reported at this time last year. According to media reports, home fires have already claimed 148 lives this month, 24 more than reported during Jan. 1-16, 2012".[30] When annualized, this number indicates that, even today with all of the technology and system's purported prevention and protection measures which are "required" by code and laws throughout America, nearly 3.600 people will lose their lives because of fire; one is too many. Statistics indicate that, in the coming year, between 16,000 and 17,000 additional Americans will suffer injuries substantial enough from fire that they will be admitted to the hospital. Most fire deaths are not caused by burns, but by smoke inhalation.[31] The same is true for fire "injuries".

There is no secret to the fact that a fire, left unaddressed by firefighters is likely to burn the structure it is located in, and perhaps neighboring structures, to the ground. Obviously the swifter the local fire department's response to the fire, the lower the chances for injury death and property damage. In America, fire departments pride themselves on quick responses to fires when called and they track and measure their record on this front through The National Fire Incident Reporting System (NFIRS). NFIRS was established in the 1970's when the to the United States Fire Administration (USFA) was authorized through the Federal Fire Prevention and Control Act of 1974 (See: PL 93-498) "*to develop uniform data reporting methods, and to encourage and assist State agencies in developing data and reporting fire damage*."[32] There is no room for doubt that getting the able personnel and equipment from the fire station to the scene of the fire as quickly as possible is horrendously important.

Maintaining the ability to respond to fires quickly and, when possible, shortening response times, is important; that fact cannot be denied. But, in America, based on a broad study of trends in the industry, response times actually appear to be getting longer rather than shorter! Despite many of America's fire department's honest and valiant efforts to do more with less, there is a major trend today of increasing response times in hundreds of cities nationwide. This emerging trend is a result of their department's steadily shrinking share of municipal budgets, the directly resulting limited manpower and not enough firetrucks, increasing traffic congestion and a lack of new technology and tools which are gained through these resources, makes it critical to give occupants every resource possible "at the crisis location"; and, before first responder's arrival. The EMVNA provides an a stop-gap additional layer of safety to occupants experiencing this phenomenon as it can provide an alternative on-site in-the-crisis visible notification benefit to assist occupants at the point of crisis in the most critical life threatening moments; and long before responders arrive.

A fire can double in size every 20-30 seconds. Think about it; what starts out as generally a smokey non-event if contained, can turn into a raging inferno in just a few moments. After review of a city sponsored response time study done in San Diego, CA, City Council member Kevin Faulconer remarked, "The auditor's report found an overall fire department response time of 9 minutes, 27 seconds for 90 percent of San Diego's 911 calls".[33] If a fire can double in size in 30 seconds or so, imagine how big it can become in 9 minutes and 27 seconds.

If response times are getting longer, one doesn't have to be a rocket scientist to recognize that the marginal risk to life and property increase commensurately, if not logarithmically. In some cities, take Los Angeles where response times have been regularly recorded in NFIRS to be as long as 14-17 minutes, the chances that the fire department personnel were actually there, in the fire-ground and on the scene in the most critical of moments saving lives and property, is immensely inhibited. What might have been just another quick run for the fire department to one of the 484,500 structure fires that occurred in America in 2011 (*NFPA/NFIRS*), could easily turn into a total loss (property-wise) and could have exposed the structure's occupants to infinitely greater risk to life and/or injury as a result of the lengthened department's response time.

On average, 50% of the score that home insurers use to set the premium rates for a homeowner's policy are based on the the quality of the property's local fire department. Response times are a large factor in the evaluation of that fire department's abilities to serve the firefighting needs of the area, and rates will surely reflect this (i.e. continue to rise) if the current trend is not addressed. Insurers are incessantly scanning the horizon to identify and incorporate new technology that can decrease the risk that they insure over. The EMVNA will undoubtedly garner the attention of and find a home in the savvy actuaries and underwriter's risk assessment models that measure and price this risk in their portfolios. As they learn of it and become aware of the innovative solution, by default, they will incorporate this innovation's affordably priced efficacy into their policies to reduce risk through addressing treating the life/injury problem created by longer response times "at the source or location of the crisis". The EMVNA is a key risk reducer in any P&C risk portfolio.

The EMVNA can serve as a life-safety measure in the home or structure which can add precious moments to an occupant's ability to see and locate an exit as the unaddressed fire grows and smoke fills the space. These types of measures are necessary when it takes longer for our firefighters to get to the scene, and AHJ's will certainly need to direct their thoughts to this innovation moving forward for the sake of the lives depending on it. Insurers will certainly adopt this technology in an effort to reduce risk in their portfolios as they come to understand its marginal efficacy in any setting.

Considering the EMVNA's superior effectiveness; and whom it serves in the fire-ground setting:

- In the case of the Single-Station EMVNA, audible alarm smoke detectors or other audible alarm system notification devices audibly alert an occupant to the presence of smoke & fire; a EMVNA goes another step forward when these alarm sounds are broadcast to also "visibly" assist occupants in locating the path of egress and/or exit point to escape a fire and/or smoke.
- EMVNAs do not require the ability to read to detect the exit; thereby aiding the very young and people with visual impairments or other potential escape hindering disabilities recognized under the ADA.
- EMVNAs are visible from any angle, regardless of the occupant's angle of approach toward it.
- By providing a brightly illuminated strobed flash-pattern outline in the universally recognized shape of a

doorway, a EMVNA is quickly recognized by every occupant; thereby expediting evacuation of occupants in a fire or smoke event.

- Unlike Conventional visual notification appliances and most other energized exit marking devices, EMVNAs provide a much more readily visible form of visual information in areas that continuously lie below the smoke layer, from the top of the doorway, down the lengths of its sides AND along the floor areas flanking the doorway as smoke fills a volume of space. This configuration of light messaging provides occupants with the most possible time during evacuation to locate the path of egress or exit termination.
- Integrated EMVNAs commence their operation when other notification appliances in the notification appliance circuitry are triggered in a fire or other emergency long before first-responder emergency personnel can arrive at the scene and before smoke can become deadly.
- The functionality of the EMVNA's linear configured flash configuration also aids responding emergency personnel as they enter and exit a residence or building by providing a clear demarcation of the path of egress and/or exit points in settings usually unfamiliar to them as they perform their search, rescue, extraction and fire suppression duties.
- Like other visual notification appliances, EMVNAs remain functional during the ENTIRE fire or smoke event to assist rescue personnel in their efforts in the fire ground long after the building, area or space has been filling or is filled with smoke.

In summary; A case for embracing advancement in visual notification

Other than apathy, or perhaps systemic dysfunction, there is no excuse for America's dire fire and smoke inhalation related injury and death rates. Historically, technological advancements, like the EMVNA don't often come down the fire safety and fire-prevention industry's path. The leap forward that it presents to advancing safety for the hearing impaired (and others) everywhere, especially the highest risk groups (children, seniors and other disabled persons), is a boon to fire safety everywhere. Not only does the EMVNA alert, demark and direct occupants, it actuates and operates immediately upon detection of fire with other devices on the NAC (I-EMVNA) or when audible alarms are triggered (S-EMVNA).

As a significant advancement in fire safety in a myriad of ways, the EMVNA does not suffer the same occlusion or visibility effects that the uncontrollable nature of smoke undoubtedly presents to traditional conventionally used visual notification appliances and exit signage in every fire. Unlike any other visible notification appliance, the EMVNA delivers a more effective emergency informational light message at exactly the right times and delivers it in precisely the most effective locations for the deaf and hard of hearing and the highest fire-risk groups of occupants. The EMVNA lights the entire universally recognized outline of the exit doorway and commences its work long before responding rescue personnel arrive. After arrival and in the fire ground, the EMVNA supports rescue personnel whom commonly have little to no familiarity with the particular space or knowledge about how to navigate through it to perform their search, rescue, suppression and/or extraction duties.

Codes, laws and standards that evaluate and measure such new technologies are all expressly aligned to promote the introduction of such innovation to the masses for safety's sake. Despite that technology is often suppressed due to the oligarchical arrangementof the collective participants in the notification appliance manufacturing industry and their gargantuanly large capital structure which provides nearly insurmountable barriers to entry for small innovators with truly marginally effective betterments to existing technology, the law is the law and it is clear that it provides a means through which technologies, like the EMVNA, can gain a foothold because of its marginal efficacy. In the case of the EMVNA, the law serves to recognize its importance and to unbridle its technological advancement for the benefit of the deaf and hard of hearing "and" any sighted occupant which can benefit from its use in a fire. Installing EMVNAs and embracing new fire-safety technology across the board is a responsible step toward the embrace of commitment to bringing America's dire fire statistics in line with other industrialized nations around the world; not to mention that it is just "the right thing to do for the those whom cannot hear.

The United States desperately needs to embrace new technologies in fire safety. For being one of the most advanced societies on the planet in most respects, America's record in the realm is abysmal. "Despite common use of sprinklers and smoke alarms, North America has the worst fire death rate in the industrialized world." (-*NFPA,*

and -USFA). “The United States historically has had one of the highest fire loss rates of the industrialized world – both in terms of fire deaths and dollar loss. This unenviable status has perplexed many experts in the fire world. However, most of the advanced fire technology used in the United States is installed in public places, and most fire deaths occur in the home.” (-*NFPA*)

The EMVNA differentiates itself by being the first NAC-integrated visible notification appliance of its kind to provide floor-level visual notification to occupants of a building, area or space in fire conditions. Oddly enough, this floor-level location has always been where evacuating or relocating occupants, specifically the deaf and hard of hearing, need it most. Its capabilities to effectively and easily blend its superior alerting capabilities as part of an alerting system with a superior means of exit demarcation to direct occupants to the closest exits in a fire or other emergency with special utility to the deaf and persons with hearing impairments must be considered.

-A note to AHJ's

The EMVNA's design and superior operational functionality places it well within the scope and intent of most fire codes, federal, state and local accessibility laws and the standards that oversee the manufacture of such devices and appliances. Please consult you appropriate codes and ordinances. Although, by definition, Supplementary Visible Notification Appliances, like the EMVNA, are not expressly required by code in every circumstance, AHJ's responsible for insuring that any given building, area or space in public accommodations, commercial facilities and other qualifying ADA protected facilities, which, by definition, address the needs of the deaf and hard of hearing, have the right to require this advancement in technology because, its very design, functionality and affordability confirms that it passes the equivalent facilitation test when compared to other traditional visual notification appliances.

Additionally, it is important to note that under the Americans with Disabilities Act of 1990, et seq., new advancements in technology *must not be prohibited*, provided that the new technology provides an advancement toward creating an opportunity for *equal benefit* for deaf and hard of hearing people to enjoy the same emergency notification benefits provided in a public accommodation setting that their hearing co-occupants enjoy. This dissertation provides ample examples for consideration as to why the EMVNA can provide *equal benefit* to the deaf and, moreover, why it, generally, is “*reasonably accommodatable” and “readily achievable”*. Given that the EMVNA, in most circumstances meets these requirements and tests, logic would dictate that the AHJ may require its installation and use where and when he/she is compelled to meet the needs of deaf and hard of hearing or other disabled persons; this includes most public accommodation building facilities.

As the first technology to combine these cost efficient functional advancements in an easily deployable format, encouragement of the installation and use of the EMVNA can be a simple step forward to bring America's performance up to standard as a fire safety leader in providing safer environments for the deaf and hard of hearing population.

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