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Product Safety Guide for Developing Documentation for Fire Alarm Systems and Equipment

NEMA

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PRODUCT SAFETY GUIDE FOR DEVELOPING DOCUMENTATION FOR FIRE ALARM SYSTEMS AND EQUIPMENT

Published by

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Preface

About This Guide

This guide was developed by the National Electrical Manufacturers Association (NEMA) for use by companies that manufacture and sell selected fire alarm systems equipment as an aid when developing product documentation, such as installation manuals, operation manuals, and product labels. The guidelines provided in this book are intended to help make product documentation complete, accurate, and clearly written. Unless otherwise noted, this document constitutes Authorized Engineering Information.

This guide is designed for use by those creating and maintaining documentation for fire alarm equipment. It is assumed that the reader is familiar with basic technical writing skills and the fire alarm equipment (initiating devices, alarm panels, notification appliances) being documented. This guide is a working sample of the guidelines it contains and can be used as an example when developing other documents.

How This Guide Is Organized

This book contains the following sections:

Section 1, "Introduction," which provides an overview of how to use this book to write fire alarm product documentation. Read this section before proceeding to the other sections.

Section 2, "A Process for Developing Documentation," provides a series of steps you can use when developing product documentation to encourage completeness and accuracy.

Section 3, "Common Product Information," provides a list of general items to consider when documenting all types of fire alarm equipment.

Section 4, "Documenting Initiating Devices," provides suggestions about specific topics to be included when documenting initiating devices, such as detectors.

Section 5, "Documenting Notification Appliances," provides suggestions about specific topics to be included when documenting notification appliances, such as alarms.

Section 6, "Documenting Control Panels," contains suggestions about specific information to be included when documenting control panels.

Section 7, "Developing Product Labels," which explains how to create various types of product labels.

Appendix A, "Documentation Samples," provides some generic examples you can use in your documentation.

Appendix B, "Recommended Document Organization and Style," contains basic information on how documents can be written and organized.

The **Glossary** contains definitions of special terms used in this book.

Where to Look for More Information

Following is a list of items that might be helpful when developing product documentation.

About NEMA guidelines:

- *Guide for Proper Use of Smoke Detectors in Duct Applications*
- *Guide for Proper Use of System Smoke Detectors*
- *Training Manual for Fire Alarm Systems*

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About grammar, punctuation, and spelling:

- *The Elements of Grammar* by Margaret Shertzer
- *Webster's New Collegiate Dictionary* by Simon and Schuster

About document style, content, and layout:

- *The Elements of Style* by Strunk and White
- *The Chicago Manual of Style* by the University of Chicago Press

About assessing readability of your documents:

- *RightWriter* © by *RightSoft, Inc.*
- *Grammatick IV © Writing Improvement Software by Reference Software International*

About technical writing:

- *Clear Technical Writing* by John A. Brogan

For other general information that may be helpful to a technical documenter refer to other NEMA technical publications, standards and guides of NFPA, ISO, UL, FM etc.

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Section 1
INTRODUCTION

1.1 GENERAL

All product related documents should be as clear, accurate and complete as possible. Their purpose is to convey information to people who come into contact with the product — users, installers, maintenance people, bystanders — and to influence the behavior of these people. This guide contains many tips and suggestions that, when followed, will help you achieve that goal.

Manufacturers must meet not only the practical need to get people to use products properly, so as not to create problems for themselves, they must also meet new responsibilities that are placed on them by law. People who are injured as a result of the use of your product may seek recourse through the courts. Many of the theories of liability that have been expanding over recent years are causing courts to examine the information given by the manufacturer and the manner in which it was communicated.

As manufacturers of fire alarm systems and components, your products are essentially passive in operation, and do not pose a direct danger to people. Unlike manufacturers of power mowers, chain saws, automobiles and dirt bikes, your systems do not impel rocks, throw chains, crash into each other, have high speed blowouts or engine fires. It may appear that you have nothing to worry about; but you do.

As law has evolved, a duty to warn has been created that imposes upon a manufacturer the need to warn users of its products, of any foreseen limitations on their use. This duty is imposed with regard to all persons who come into contact with your product — installers, testers, owners and occupants.

The manufacturer's paramount legal duty, however, is to design for safety. Warnings and instructions are no substitute for safe design. Only after the product has been designed to operate safely should the manufacturer consider adding precautionary statements.

Although the primary focus of this guide is to help you write installation and user manuals and product labels, the concepts presented can be used to improve the other types of product documents you create, such as:

- Product design specifications
- Product design review meeting minutes
- Manufacturing records
- Quality assurance plans
- Testing specifications
- Marketing documents
- Instruction manuals
- Maintenance procedures and reports
- Returned materials records
- Warranty reports
- Failure to review meeting minutes
- Service reports
- Complaint reports
- Certification documents.

1.2 HOW TO USE THIS GUIDE

The following list provides a brief overview of how you can use this guide when developing documentation for fire alarm equipment:

- Look over the document development process outlined in Section 2. Using this approach promotes a sound documentation development process that can be applied to all types of product documentation. Appendix B provides information about possible document organization and style.
- Once you understand the basics, read Section 3 for some general guidelines to keep in mind when writing all types of product documentation.
- When you are ready to start writing documentation for a specific type of product, look over the section describing that type of product. The sections provide checklists of the types of information you should consider including, but do not provide the exact text you should write.
- Section 4 explains how to document initiating devices (e.g., detectors). Section 5 provides information on documenting notification devices (alerts), and Section 6 contains points to consider when documenting control panels. Section 7 explains how to develop various types of product labels.
- Appendix A provides some specific examples of actual text you can use when developing documentation for all of the different types of equipment.

If you encounter any unfamiliar terms while using this guide, refer to the Glossary for a definition of the term.

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Section 2
A PROCESS FOR DEVELOPING DOCUMENTATION

2.1 GENERAL

The recommended documentation development methodology consists of the following major steps:

- Gather relevant information
- Identify the document's audience
- Define scope of document
- Develop content plan
- Develop schedule
- Develop document
- Conduct document reviews
- Revise document
- Publish document
- Determine document retention period
- Determine document update schedule.

Each of these steps is described in more detail in the following sections.

2.2 GATHERING RELEVANT INFORMATION

Before you can begin writing product documentation, you need to gather as much information as possible in order to have a complete understanding of the product — you can't write about something you don't understand.

2.3 GATHER SOURCE MATERIAL

Using the product design specification as the basis, find out if there are any additional materials you could use when developing your product documentation, such as old versions of product documentation or industry publications.

2.4 INTERVIEW OTHER STAFF MEMBERS

Another effective way of gaining product knowledge is to interview those personnel familiar with the product, such as technical personnel, end users, or other writers who might have worked on a similar product.

To take best advantage of your interviews, be as prepared as possible. Ask specific questions and jot down the answers immediately, making sure to get it all down accurately. When asking questions it is also important that you put yourself in the place of the user and ask questions that reflect the user's needs, such as:

- How could the user get hurt using this product in its intended application?
- Could the user get hurt using the product incorrectly ?

Keeping the use and user's needs in mind will help you maintain focus, so that your product will be used in the way it was intended.

2.5 DEFINING THE AUDIENCE OF THE DOCUMENT

One of the most important tasks you face as a writer of product documentation is knowing your reader. If you do not fully analyze your audience, you run the risk that your document will not be useful to the very people you need to inform.

2.5.1 Consider Education Level

Consider the education level of the average reader. Your documents may need to be written to the reading comprehension level of the average seventh or eighth grader. Depending on the type of information you are trying to convey, your reader may not even be literate. Pictures are an important tool in this situation.

There are several software products currently available which can electronically read your documents and analyze them for punctuation errors, word usage, and calculate the reading comprehension level the reader would need to understand your document. See "Where to Look for More Information" on page iv for a partial list of these software products.

2.5.2 Consider Language Requirements

Consider the native language of the average reader. If your documentation is written in English but the product will be used in a primarily Spanish speaking location, your documentation will be useless. Needless to say, this could lead to misuse of the product and, ultimately, to injury or death. Know your market and consider the translation of all product documentation when required. Consider using pictograms to convey important information.

2.5.3 Consider Technical Background

Consider the technical background, training and prior product knowledge of the reader. For example, an installer would reasonably be expected to have a higher level of product knowledge than an end user, and be skilled in the art of installation. This means that a different level of information and style of presentation may be applicable. However, take care not to make too many assumptions about what the reader knows.

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2.5.4 Consider the Tasks the User Needs to Perform

Consider the types of tasks the average user will perform while using your documentation and in what environment. Different types of tasks require different types of documents. For example, an installation manual may contain pictures of the product being installed, wiring diagrams, and precise, step-by-step instructions that guide the installer through complete installation and testing. However, the occupants of the facility protected by the product probably would not need to know about product wiring, but would need to know how to recognize when the product is indicating an alarm condition.

The table below is a typical matrix showing the relationship between type of audience and the type of information that audience needs.

	Audience			
	Distributor	**Installer**	**Test**	**User**
Detector				
Design	X			
Install	X	X		
Test/Maint		X	X	X
Panel				
Design	X			
Install	X	X		
Test/Maint		X	X	
Operate		X	X	X
Alert				
Design	X			
Install	X	X	X	X
Test/Maint		X	X	X

2.6 DEFINING THE SCOPE OF THE DOCUMENT

Consider the intended purpose of each document before you begin writing. This includes a determination of what the reader should be able to accomplish after reading the document. For example, if the document is designed to instruct a user how to operate a specific initiating device, the document should begin at the point where the product is successfully installed and ready to use.

This exercise also serves to define the limitations of the document, making creation of the document that much easier. The scope and limitations of the document should be clearly stated in the document so the reader knows whether the document provides the information he or she needs.

2.7 DEVELOPING THE CONTENT PLAN

Develop a detailed content plan, or outline, of the information to be contained in the document. A content plan identifies the proposed structure and content of the guide and provides a visual tool that the product development team can use to evaluate whether the guide will achieve its intended goal.

A content plan should identify each element of the document in sequence, including the front matter (title page, copyright page, table of contents, list of illustrations, and preface), each section and all major headings within, each appendix, and the back matter (glossary, index, and reader comment form). See Appendix B for more information on these document sections. A content plan should also describe the location and content of any graphics that will appear in the document.

2.8 DEVELOPING THE SCHEDULE

Consider when the documentation needs to be done so you can allow adequate time for all of the necessary activities, such as writing, editing, illustrating, reviewing, printing, and packaging. This will help you determine the manpower resources you will need and when you will need them. Make sure you also consider the scheduling of non-writing resources you might need, such as technical personnel or regulatory agencies to review your document. This is the time to define any dependencies you have on other team members.

Your product documentation should be done in time to allow your Quality Assurance Department and field installation groups to test it at the same time as the product. This is an important step in achieveing accuracy and completeness.

2.9 DEVELOPING THE DOCUMENT

Develop the document using the content plan, following the guidelines provided in this guide as a supplement to your company's style and editorial guidelines. The thorough planning you've done by following this methodology so far should help produce a complete, logically organized, well-written document.

Make sure you keep backup copies of your document at regular intervals throughout the development cycle. Also, make sure you monitor adherence to the development schedule and immediately alert the product development team if your schedule slips. Failure to do so could cause the product to be released with incomplete documentation.

2.10 CONDUCTING A DOCUMENT REVIEW

Once your document is complete, distribute it to each member of the development team for review. Each team member should review the document from the perspective of his or her functional area of responsibility. For example, a developer should focus on functional accuracy, and your legal counsel should evaluate concurrence with applicable laws, regulations and currently decided cases. Make sure you allow the reviewers enough time to thoroughly review the document, or the quality of the document might suffer. Upon completion of the review, each team member should forward any comments or concerns to you for resolution. If

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you cannot successfully resolve all items identified during the review, the team might need to meet to jointly determine a resolution.

The document review stage may also require the approval of a regulatory agency or Nationally Recognized Testing Laboratory. Make sure that you reach agreement about the way information is conveyed; wording required by the agency does not relieve the manufacturer of the need to convey that information clearly.

Depending on the type of product and application, you may see some advantage in gathering responses and comments from typical document users.

You may also want to consider having a "safety audit" performed on the document to ensure that information relating to user safety is clearly and fully stated.

2.11 REVISING DOCUMENTS

After you resolve any problems or comments identified during the document review, you can make the necessary revisions. After all revisions have been entered, try to get an editor to perform a thorough copy edit of your document to assess the readability level of the document and to check that it meets your company style and editorial guidelines.

2.12 PUBLISHING DOCUMENTS

After the final edit, you are ready to print the camera-ready copy and prepare for duplication and packaging of the document.

One of the most important parts of publishing product documentation is developing a procedure to keep track of who has the document, in order to distribute updates as widely as practicable.

2.13 DETERMINING THE DOCUMENT RETENTION PERIOD

Most companies now have document retention policies that include guidance on what kinds of documents should be retained and when documents should be destroyed. The drafts and documents discussed in this guide should be no exception to the rule, and ought to be considered when reviewing and enforcing the corporate document retention policy. Since no two companies conduct business in the same way, no two document retention policies are likely to be the same.

2.14 DETERMINING THE DESIREABILITY OF DOCUMENT UPDATE

Applicable laws and technical standards change from time to time, as do products; such events may create a reason for document revision and redistribution.

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Section 3
COMMON PRODUCT INFORMATION

3.1 GENERAL

This section provides an overview of general information that you should consider when writing product documentation. As you develop your document, review each topic in this section to see if it applies to the product you are documenting. There might be more topics that you need to include for the product you are documenting, but you can use this section as a foundation.

The information in this section includes suggestions for:

- Identifying the authority having jurisdiction
- How to document the product
- How to document product installation procedures
- How to document product maintenance and testing procedures.

You should look over this section before proceeding to the sections that explain how to write documentation for specific products.

3.2 DEFINING AUTHORITY HAVING JURISDICTION

The term "authority having jurisdiction" has become a standard term in the fire industry. An acceptable definition of "authority having jurisdiction" is:

> "Fire alarm systems installed in the USA fall under the jurisdiction of some authority. In some areas this may be a local fire department; in other areas it may be a building inspector, insurance firm, etc. Different authorities may have their own local requirements for the way the fire alarm system is installed and used. Most local authorities base their requirements on the NFPA codes, but there may be important differences. You must install this system in the way in which the authority having jurisdiction requires. If you do not know which authority has jurisdiction in your area, contact your local fire department or building inspector for guidance."

It is important that you tell users to be aware of any requirements defined by the authority having jurisdiction.

3.3 DOCUMENTING THE PRODUCT

This section contains a list of topics to cover when documenting the product, including:

- Functions and features
- Applicable standards
- Operating parameters
- Applicable warnings
- Power supply specifications
- Environmental consideration
- Wiring specifications.

3.3.1 Product Functions and Features

You may wish to include the following information about the features and functions the product is designed to perform:

a. A description of the product defining its intended use.
b. A list of the capabilities of the product.
c. A description of any limitations of the product.
d. A list of devices compatible with the product.

3.3.2 Applicable Standards

Include a description of the applicable standards with which the product complies, including NEMA, NFPA, OSHA, UL, FM and other standards.

See Appendix A and 4.5.6 for samples.

3.3.3 Operating Parameters

Warn reader about what **not** to do.

A good way to increase the likelihood that instructions get read is to attach them to the product itself.

3.3.4 Applicable Precautionary Information

Your document should include information and limitations that the user needs to know about the use of the product, including:

a. Effects other systems can have on alarm system wiring.
b. The importance of compliance with applicable codes and standards.
c. Possible results of misapplication.
d. Risks associated with altering the equipment in any way.

This guide identifies, and provides examples of, some of the precautionary information you may wish to provide; however, it does not provide a complete list of those that may be appropriate for your product manuals. You should add whatever information and warnings apply to your product.

3.3.5 Environmental Considerations

Provide a complete description of the environmental conditions under which the product has been specified to perform, including:

a. Temperature range, listing the recommended range for optimum performance and the maximum range under which the product will still perform according to specifications.
b. Humidity
c. Salt spray
d. Dust
e. Altitude
f. Vibration resistance.

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g. AC Voltage ranges.
h. AC frequency stability/accuracy required.
i. Electromagnetic and Radio Frequency susceptibility and emissions.

If there are different values for operating and non-operating (for example, shipping) conditions, you should state them both.

See Appendix A for samples.

3.3.6 Wiring Specifications

Provide a description of the product's wiring specifications. Your description might include the following:

a. That the wiring specifications consider any applicable local codes, manufacturer's recommendations, NFPA standards and the authority having jurisdiction, and that any wiring specifications provided are not intended to circumvent any required codes, laws, or requirements.
b. A list of acceptable installation materials that can be used, such as metallic conduit, metallic raceway, or plastic pipe.
c. A list of any limitations caused by using each type of acceptable material, for example wiring exposed to the weather should be shielded by rain-resistant fittings.
d. Any restrictions that apply to the fire alarm system wiring, such as whether only alarm system wiring can be run in the same conduit, raceway, or multi-conductor cable.
e. That the wiring should be tested to ensure the absence of any defects (such as shorts, extraneous voltages, and resistance to ground) and any special testing requirements (such as impedance or insulation resistance).
f. A list of any wiring standards for peripheral devices, such as requiring each to have its own enclosure.
g. A description of the technical wiring requirements for each device, including the maximum number of circuits and the number of wires per circuit, zone resistance, and total wire length.
h. An explanation of how to terminate the ground wire.
i. Any restrictions or recommendations about connection of shields or conduit, routing and maintenance of ground paths.
j. Installation of any special transient suppression devices.

See Appendix A for samples.

3.4 DOCUMENTING GENERAL INSTALLATION FORMATION

This section provides a checklist of the kinds of information that you should consider including in installation manuals for all types of fire alarm equipment. For example:

3.4.1 Before Installation Begins

a. Include a statement that most fire alarm systems are installed to meet requirements of applicable laws. The authorities enforcing these laws should be consulted for specific approval of installation methods and component locations.
b. Advise the owner/user to be aware of any environmental considerations affecting how and where the system should be installed.
c. Advise the installer to be aware of local codes, architects' plans, NFPA standards, or rulings made by the authority having jurisdiction regarding what types of equipment can be used, where the fire alarm components should be located, and how the circuits should be arranged.
d. Stress that the installation should only be performed by a qualified service agent.
e. Advise the installer to read and understand all information presented in the instruction manual before proceeding with the installation.
f. Include a reminder that the installation must be in accordance with the installation manual.

3.4.2 About the Installation Process

In your document you may want to advise or stress -

a. That the installation steps should be followed in sequence, do not deviate or assume any details not shown in the manual.
b. That the installation must be in accordance with the codes and standards set forth by the authority having jurisdiction.
c. The sequence in which fire alarm components must be installed, such as installing the control panel before installing peripheral devices.
d. The hazard of misapplication of or alteration to the product.
e. A list of any special tools that the installer might need during installation.
f. An order for installation tasks in the sequence in which they should be performed, by listing the tasks numerically. Clearly word each step so that it leaves no doubt in the installer's mind about what should be done.
g. How to confirm the successful completion of each step. For example, the control panel lights should display upon successful connection of the wiring to the electrical supply.
h. A way for the installer to get information if any questions arise during installation, such as a telephone number to call for support or where to get additional documentation.

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3.4.3 Once Installation Is Complete

Make sure that:

a. A copy of the installation and user manuals must remain with the system at all times.
b. The owner and/or user is aware of the testing and maintenance requirements for the product.
c. The owner and/or user is aware of the need to instruct staff and occupants in safety procedures.
d. The owner and/or user is aware that only qualified and competent installers, operators, and service agents should be allowed to operate or service the product.
e. Someone should perform an initial acceptance test of the system after is has been installed to ensure that the system was installed correctly and that it works correctly.

This section listed only the *typical* installation considerations that apply to all types of fire alarm equipment. Document any specific installation considerations applicable to each product you develop.

See Appendix A for samples.

3.5 DOCUMENTING TYPICAL MAINTENANCE AND TESTING PROCEDURES

This section provides a checklist of items to consider when you document typical fire alarm equipment maintenance and testing procedures. Use this information as a foundation, but make sure to add specific maintenance and testing information for the product being documented.

3.5.1 Typical Maintenance Procedures

Maintenance procedures document what types of preventive measures should be taken on a regular basis so that the product remains in a constant state of good repair and able to perform its intended function. Typical maintenance items to be documented are:

a. A notice specifying that maintenance should be performed only by those qualified to perform it on the specific piece of equipment.
b. A recommendation that the qualified person conducting the maintenance (the maintainer) have the following items available for reference during the maintenance:
    1. A copy of the product's installation manuals and user manuals.
    2. A drawing of the complete installation, including where each device is located, wiring methods, and sequence connections between devices and control units.
    3. A copy of any applicable standards under which the maintenance will be performed, such as NFPA standards.
    4. A record of any previously conducted tests, including the testing performed after initial installation, so you can compare the electrical measurements taken then with those taken recently. This could be very helpful when troubleshooting present problems and could even help prevent future problems.
c. That the "maintainer" should inform proper authorities that the product will be undergoing maintenance *before* beginning the maintenance and that the product will temporarily be out of service.
d. That the "maintainer" should disable the product (and other products it controls) before performing maintenance to prevent unwanted alarms.
e. That the "maintainer" should not disable the product without making sure the building occupants are still protected against fire and/or that the building facility manager and/or the authority having jurisdiction are notified.
f. A statement of how often maintenance should occur.
g. A detailed description of the types of maintenance that should be performed.
h. That maintenance must be conducted in accordance with the maintenance procedures recommended in the product documentation.
i. That the maintainer should enable the product (and other products it controls) after the maintenance is complete.
j. That the maintainer should inform the proper authorities that the maintenance is complete and the system is once again operational.

3.5.2 Typical Testing Procedures

Testing procedures describe the steps that should be taken on a regular basis to demonstrate that the product performs according to its documented capabilities. Consider the following typical testing items:

a. Testing should only be performed by those qualified to test the specific piece of equipment.
b. The person conducting the test ("tester") should inform proper authorities that the product will be undergoing testing before beginning the test.
c. The "tester" should inform all persons who would normally receive an actual fire alarm signal that the product will be undergoing testing before beginning the test.
d. The "tester" should disable the product (and other products it controls) before performing testing to prevent unwanted alarms.
e. Suggest that testing occur, at minimum, after initial installation, after any maintenance, repair or replacement is performed, after a warning or trouble condition, and at regular intervals as appropriate for the product, or as required by applicable codes.
f. A description of the types of testing that should be performed.

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g. A description of what the "tester" should do if the product passes each test performed.
h. A description of what the "tester" should do if the product does not pass each test performed.
   1. A description of the conditions under which it is appropriate to repair the product, and a statement to the effect that repairs must be done by a qualified repair person following recommended repair practices.
   2. A description of the conditions under which it is recommended (or mandatory) that the product be replaced.
   3. That the product must be tested again after being repaired or replaced to ensure that it is working correctly.
i. That the testing must be conducted in accordance with the testing procedures recommended in the product documentation.
j. That the "tester" should enable the product (and other products it controls) after the testing is complete.
k. That the "tester" should inform the proper authorities and all persons who would normally receive an actual fire alarm signal that the testing is complete and the system is once again operational.

3.5.3 Recommended Maintenance and Testing Log Procedures

NFPA 72H *Guide on Testing Procedures for Signaling Systems,* recommends and defines the level of testing required of a fire alarm system and the types of testing log to be kept.

Your document should recommend that the owner maintain a permanent test log for each product installed. Each product should be clearly described, with information on the type of product, the model number, the serial number (if any), the location, and the type of environment. Data entries should include test dates, type of test made, test results, maintenance performed, and comments.

3.6 DOCUMENTING REPAIR PROCEDURES

Provide a list or description of the items that may be repaired, and the procedures that must be followed. Repairs should only be conducted by qualified repair persons using the recommended repair practices.

3.7 DOCUMENTING EMERGENCY PROCEDURES

Encourage the owner/user to develop a plan of action to be followed in emergency situations. This includes such items as:

a. Developing facility evacuation procedures that encourage safe, swift evacuation of building occupants in the event of a fire.
b. A recommendation to hold periodic fire drills to increase the likelihood that building occupants know what to do in the event of a fire and to test the facility evacuation procedures.
c. A recommendation to compile a list of emergency telephone numbers and reporting procedures, posted near the fire alarm system.

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Section 4
DOCUMENTING INITIATING DEVICES

4.1 GENERAL

This section contains specific topics to consider when documenting initiating devices. These considerations are presented briefly; however, there are specific examples included in Appendix A. See also Section 3, "Common Product Information," for other topics to be included.

4.2 STANDARDS

You can reference your reader to applicable NFPA, UL, and industry publications and standards. You should also indicate with which standards the device conforms.

4.2.1 NFPA Codes and Standards

NFPA publishes codes and standards concerning all phases of fire protection. Examples that directly concern automatic smoke detectors found in Table 4-1.

Table 4-1
FIRE PROTECTION CODES AND STANDARDS

Number	Title	Comment
NFPA 70	National Electrical Code	
NFPA 72	Installation, Maintenance and use of Protective Signaling System	
NFPA 72E	Automatic Fire Detectors	Covers minimum performance, location, mounting, testing and maintenance requirements of automatic fire detectors.
NFPA 72H	Guide for Testing Procedures for Protective Signaling Systems	
NFPA 90A	Standard for the Installation of Air Conditioning and Ventilating Systems	Provides information about the use of smoke detectors in ducts of HAVAC systems and smoke control systems.
NFPA 101	Life Safety Code	Specifies the requirements for smoke detection in both new and existing buildings depending on the type of occupancy.

4.2.2 UL Standards

UL standards that directly concern initiating devices are listed in Table 4-2.

Table 4-2
INITIATING DEVICES STANDARDS

Standard	Title
UL 217	Single and Multiple Station Smoke Detectors
ANSI/UL 268	Standard for Smoke Detectors for Fire Protection Signaling Systems
ANSI/UL 268A	Standard for Smoke Detectors for Duct Applications
ANSI/UL 864	Standard for Control Units for Fire Protective Signaling Systems
ANSI/UL 521	Standard for Heat Detectors for Fire Protective Signaling Systems
ANSI/NFPA 4913 UL 913	Standard for Intrinsically Safe Apparatus and associated apparatus for use in Class I, II, and III, Division I, Hazardous Locations
UL 38	Signaling Boxes, Manually Actuated, for use with Fire Protective Signalling Systems
UL 228	Door Closures, Holders and Integral Smoke Detectors
UL 753	Alarm Accessories for Automatic Water Supply Control Valves for Fire Protective Signaling Systems

4.2.3 Nuclear Regulatory Commission

The NRC have rules concerning documentation and labeling of equipment containing radioactive materials, for example ionization smoke detectors. You should check carefully to be certain all their requirements have been complied with.

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4.2.4 Federal Communications Commission

Any devices which use an internal oscillator (for example certain classes of device which contain an internal microprocessor or microcontroller) may be subject to the interference rules of the FCC. The FCC rules part 15 include certain required wording that you may need to include in your documentation.

4.2.5 Industry and Manufacturer's Publications

You might also reference any available industry publications; for example, *NEMA Guide for Proper Use of Smoke Detectors in Duct Applications* and *NEMA Guide for Proper Use of System Smoke Detectors*.

Indicate that the manufacturer of the initiating device being used should be contacted for any additional published information on their products. Include how the reader would go about contacting the manufacturer for copies.

4.3 TOPICS TO CONSIDER

In addition to the topics presented in Section 3, some topics to consider when you are documenting initiating devices are:

4.3.1 Type of Device

As part of your description of the product, define what an initiating device is in general. Describe their normal function. Then you can lead into characteristics of your particular device.

4.3.2 Applications

Describe which type of initiating device to use for a particular application, for example some situations call for smoke detection where a photo-electric technology device may be most appropriate. Don't say anything to let the reader believe he does not have to comply with local codes and the "authority having jurisdiction."

4.3.3 Limitations

Identify any situations where other types of detectors either might be used or would be more appropriate.

You should also indicate that smoke detectors do have limitations.

See Appendix A, page 29 for samples

Include information that initiating devices will not work if they are not connected to the control panel, are not powered, and/or the circuit or the panel is in a trouble condition.

4.3.4 Placement and Spacing

You should indicate proper detector placement and spacing and reference the appropriate standard.

You should also cover where **not** to place detectors. See Appendix A for examples.

4.3.5 Compatibility

Not all detectors are compatible with every control panel. Organizations such as UL test detectors and panels and list devices that are compatible. You should indicate the compatibility for your product and stress that *only* those devices and panels listed should work together.

See Appendix A for sample.

4.3.6 Detectors in Air-Handling and Air Conditioning Systems

If you are documenting detectors for use in air-handling and air conditioning systems, consider adding the following reference to your document:

See *NEMA Guide for Proper Use of Smoke Detectors in Duct Applications*, NFPA 72E *Automatic Fire Detectors*, and NFPA 90R (Chapter 4) *Installation of Air Conditioning and Ventilating Systems* for more specific information.

4.3.7 Zoning

Consider providing guidelines about how to put detectors into zones in order to provide maximum coverage. If you are documenting addressable or analog detection systems talk about dividing the detection loop up into 'zone' like areas, perhaps with isolators. Talk about issues of integrity and redundancy in detector layout and zoning.

See Appendix A for samples.

4.3.8 Operation

Include sufficient information about how the device operates so that users can properly operate the device. Fully describe normal operation.

4.3.9 Maintenance

Fully describe proper care of the device including cleaning practices and procedures. See section 3, "Common Product Information," for some general suggestions.

4.3.10 Testing

Include instructions both about installation testing and about periodic maintenance testing. Be sure and include how often the device should be tested and provide a testing procedure.

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Section 5
DOCUMENTING NOTIFICATION APPLIANCES

5.1 GENERAL

This section provides specific topics to consider when documenting notification (indicating) devices. These considerations are presented briefly. However, there are specific examples included in Appendix A, on page 28. See also Section 3, "Common Product Information," for other topics to be included.

5.2 STANDARDS

You can reference your reader to applicable NFPA, UL, and industry publications and standards. You should also indicate to which standards the appliance conforms.

Examples that directly concern notification appliances are listed in Table 5-1.

Table 5-1
NOTIFICATION APPLIANCES STANDARDS

Number	Title	Comment
NFPA 70	National Electrical Code	
NFPA 72	Installation, Maintenance and use of Protective Signaling Systems	
NFPA 72H	Guide for Testing Procedures for Protective Signaling Systems	
NFPA 72G	Guide for the Installation, Maintenance and Use of Notification Appliances for Protective Signaling Systems	

5.2.1 UL Standards

UL standards that directly concern notification appliances are listed in Table 5-2

Table 5-2
UL NOTIFICATION APPLIANCES STANDARDS

Standard	Title
ANSI/UL 464	Audible Signal Appliances
ANSI/UL 1480	Speakers and Amplifiers for Fire Protective Signaling Systems
ANSI/UL 1638	Visual Signaling Appliances

5.3 TOPICS TO CONSIDER

In addition to the topics presented in Section 3, the following present some additional topics to consider when you are documenting notification appliances.

5.3.1 Type of Appliance

As part of your description of the product, define what a notification appliance is in general. There are many different types of appliances used to give notification of a fire alarm, both audible and visible. Describe their normal function. Then you can lead into characteristics of your particular appliance.

See Appendix A for samples.

5.3.2 Applications

Describe which type of notification appliance to use for a particular application, for example some situations call for horns while in others combination horn/strobes may be most appropriate. Don't say anything to let the reader believe he does not have to comply with local codes and the "authority having jurisdiction."

Discuss the importance of using fire notification appliances only for their intended purpose. Describe how the standards (NFPA 72A 2-8.5) require that fire alarm signals must be distinctive from all other signals in the same area.

Certain types of appliances may be made for hazardous (explosive) environments, others may be vandal resistant. Discuss the selection of the right type of notification appliance for the environment. If appliances are available with different output characteristics, such as sound level or type, discuss how to select the appropriate type.

In common with other types of appliances, detail the product specifications—environmental, electrical, etc.—so there can be no doubt of the parameters to which your appliance is specified.

5.3.3 Limitations

Identify any situations where other types of notification appliances either might be used or would be more appropriate, for example in high ambient noise appliance areas the type of notification device must be carefully selected to be

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capable of conveying the alarm condition. Consider, also, the possible presence of hearing or vision impaired people, describe how they may not be aware of certain types of notification appliance.

You should also cover any limitations that the device might have in certain applications.

Some types of notification appliances, for example speakers, are heavily dependent on the equipment driving them for their proper operation. Discuss any parameters that this equipment must meet, for proper operation of the notification appliance.

Coded notification appliances normally require special connections to the control equipment in order to produce their coded output.

Some appliances have a finite working life, this means that after a certain period of operation, or a certain time after their initial installation, they should be replaced. If this is the case with your appliances, tell the reader when they should be replaced and how to go about getting suitable replacements.

5.3.4 Placement

You should indicate proper placement of the notification appliance and reference the appropriate standard. If placement requires engineering calculations you should caution that qualified personnel should be used to determine the correct placement.

You should also cover where **not** to place the appliance. In particular you should discuss how to place audible devices so that they are heard, but are not so close to people so that they cause pain.

5.3.5 Describe Sounds or Appearance

Fully describe any sounds the appliance might make (if it is an audible notificaiton appliance) or any change in appearance (if it is a visible notification appliance).

5.3.6 Installation and Wiring

Indicate any special requirements for installation. For example some notification appliances draw fairly high operating currents, which may require large wire gauges. Some appliances have high inrush currents when they are first operated, which may require special wire sizing. Speaker devices may have special requirements, such as shielded cable or special supervision components. Consider use of simple diagrams to help the installer connect your appliances properly. Include information on the correct way to terminate to the appliance.

If your appliances can be damaged during installation, include instructions on protection. For example, certain appliances may need to be protected from dust or paint by being 'bagged.' Remember to emphasize that such protection must be removed before the system is put into service.

Identify any special test equipment needed to set up the system, and where to get it. For example, audible appliances may need to be set up using a sound level meter.

5.3.7 Operation

Include sufficient information about how the appliance operates so that users can properly operate it. Fully describe normal operation.

5.3.8 Maintenance

Fully describe proper care of the appliance including cleaning practices and procedures.

5.3.9 Testing

Include instructions both about installation testing and about periodic maintenance testing. Include how often the appliance should be tested and provide a testing procedure.

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Section 6
DOCUMENTING CONTROL PANELS

6.1 GENERAL

This section contains specific topics to consider when documenting control panels. These considerations are presented here briefly. However, there are specific examples included in Appendix A. See also Section 3, "Common Product Information," for other topics to be included.

6.2 STANDARDS

You can reference your reader to applicable NFPA, UL, and industry publications and standards. You should also indicate to which standards the device conforms.

6.2.1 NFPA Codes and Standards

NFPA publishes codes and standards concerning all phases of fire protection. Examples that directly concern control panels are listedin Table 6-1.

Table 6-1
FIRE PROTECTION CODES AND STANDARDS

Number	Title
NFPA 70	National Electrical Code
NFPA 71	Standard for Central Station Signaling Systems
NFPA 72	Installation, Maintenance and Use of Protective Signaling Systems
NFPA 72H	Guide for Testing Procedures for Protective Signaling Systems
NFPA 13	Installation of Sprinkler Systems
NFPA 78	Lightning Protection Code
NFPA 1221	Maintenance and Use of Public Fire Service Communications

There may be other NFPA standards and guides that are applicable to your type product.

6.2.2 UL Standards

UL publishes an annual report listing fire protection equipment that bear the UL label. The UL standards that applies to control panels are listed in Table 6-2.

Table 6-2
CONTROL PANEL STANDARDS

Standard	Title
ANSI/UL 864	Control Units for Fire Protective Signaling Systems
ANSI/UL 506	Specialty Transformers
ANSI/UL 1411	Transformers and Motor Transformers for Use in Audio- Radio- and Television-Type Appliances
ANSI/UL 1585	Class 2 and Class 3 Transformers
ANSI/UL 497B	Protectors, Data Communicaiton and Fire Alarm Circuits
ANSI/UL 827	Central Stations for Watchman, Fire Alarm and Supervisory Services
ANSI/UL 913	Intrinsically Safe Electrical Circuits and Apparatus for Use in Hazardous Locations
ANSI/UL 1481	Power Supplies for Fire Protective Signalling Systems
ANSI/UL 1730	Smoke Detector Monitors and Accessories for Individual Living Units of Mutifamily Residences and Hotel/Motel Rooms
ANSI/UL 1711	Amplfiers for Fire Protective Signalling Systems

6.2.3 Federal Communications Commission

Any appliances which use an internal oscillator (for example, certain classes of control panel which contain an internal microprocessor or microcontroller) may be subject to the interference rules of the FCC. The FCC rules, part 15, include certain required wording that you may need to include in your documentation.

6.2.4 Industry and Manufacturer's Publications

You might also reference any available industry publications; for example, *NEMA Training Manual on Fire Alarm Systems*.

Indicate that the manufacturer of the control panel being used should be contacted for any additional published information on their products. Include how the reader would go about contacting the manufacturer for copies.

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6.3 TOPICS TO CONSIDER

In addition to the topics presented in Section 3, the following present some additional topics to consider when you are documenting control panels. Every control panel is different, manufacturers each address the design of a control panel for fire protective signaling in a different way, sometimes offering a range of solutions from one manufacturer. Many panels are modular or configurable, since every building installation is different. This guide cannot foresee every product variation, therefore there are probably many issues you should discuss in your product documentation which are not listed here. Clearly you, the documenter, must try to describe how your product is to be used and configured for all the different types of building and structure to which it will be applied.

6.3.1 Specification

List the panels specification. If there are differences in specification between panels designed for different markets, be clear what the specifications of the readers panel are.

See Appendix A for samples.

6.3.2 Describe Panel Operation

It may be helpful to the reader to recap the panels features and functions, this can help to place some of the subsequent technical information in perspective. Fully describe the panel's operation. Include the following:

6.3.2.1 Normal Operating Conditions

Tell how to recognize that the panel is functioning in its normal condition.

6.3.2.2 Alarm Condition

Describe in clear terms how to recognize an alarm condition and what to do about it. Remember that the user of your document may be responding to an emergency condition at this point, and may be imperfectly prepared for the situation. Make your instructions as simple and straightforward as possible. If you are writing a product manual more than a few pages long, consider placing a large message on the first page of the manual telling the user which page to turn to for help.

6.3.2.3 Trouble Condition

Describe what a trouble condition is and how to operate the panel while it is reporting a trouble.

See Appendix A for samples.

6.3.3 Limitations

Every fire alarm system has limitations. Good systems design attempts to maximize the probability that fire will be detected and alarms given under adverse conditions. You should tell the reader that these limitations exist and inform him of specific limitations of your equipment.

All automatic fire alarm systems equipment will not operate without power. Where batteries are used as the secondary power supply, explain that if AC power fails the system will only operate from stand-by batteries for a specified number of hours. After this period has elapsed, it will not operate or provide any fire protection until AC power is restored. Furthermore you should explain that when AC power is restored, stand-by batteries need time to fully recharge.

See Appendix A for samples.

6.3.4 Definitions

A glossary or list of important definitions may help the reader to understand technical terms used later, and avoid misinterpretation of instructions.

6.3.5 Placement

6.3.5.1 Indicate whether the control unit must be mounted in a certain position. It may be desirable to specify the access required to the panel for maintenance and operation. Consider specifying a range of mounting heights above floor level. Doing so may prevent installers from mounting the panel where it cannot be operated properly in an emergency condition. Remember people of different heights may have to operate the panel.

6.3.5.2 Any environmental conditions which affect the performance of the system should be stated.

See Appendix A for samples.

6.3.6 Quick Reference for Lights and Switches

A simple drawing showing the location of all the lights and switches and a reference table describing their function may be useful to an operator. It may aid the operators understanding to differentiate between the lights and switches discussed in the text. In general the use of drawings, pictures and figures to convey information can be helpful to the operators understanding.

6.3.7 Maintenance

Fully describe proper care of the panel, including cleaning practices and procedures.

6.3.8 Testing

Include instructions about installation testing and about periodic maintenance testing. Include how often the panel should be tested and provide a testing procedure.

See Appendix A for samples.

6.3.9 Compatible Equipment

If only certain pieces of peripheral equipment, initiating devices, alerts, etc., are compatible with the panel, then include a list of those devices that are acceptable.

6.3.10 Installation Wiring Diagrams

There should be an installation wiring diagram that can include installation information. The Nationally Recog-

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nized Test Laboratory (NRTL) may have specific requirements for wiring diagrams.

6.3.11 Control Unit General Information

6.3.11.1 Provide name or trademark of manufacturer and control panel model number. It may be valuable to indicate where on the control panel this information is located so the reader can check to be certain he is using the correct documentation for his panel. It is sometimes useful to tell him where to locate the version number, serial number or manufacturing date code; this can often help with telephone support or queries directed to the manufacturer.

6.3.11.2 Field connections can be illustrated by a drawing of installation terminals or leads to field connections as they look during installation.

6.3.11.3 Next to initiating device circuit connections, note type(s) of signaling service, manual fire alarm, automatic fire alarm, sprinkler supervisory system waterflow alarm or supervisory signal.

6.3.11.4 State name and function of lights, switches, meters, etc., next to each on the drawing.

6.3.11.5 State maximum rating of fuses in each fuseholder. It is useful to include a table giving various fuse ratings and including manufacturers and part numbers of acceptable replacements.

6.3.11.6 If there are any time limits for alarm signals, show the location of the component that adjusts it and next to the component the range of time it can be adjusted to, or the time limit if it is non-adjustable.

6.3.11.7 Identify any circuits that are power-limited. It is a good idea to explain a power-limited circuit according to the NEC definition. Identify the types of wire that can be used with power-limited circuits and acceptable installation methods. If it is not permissible to connect an external power supply say that 'USE OF EXTERNAL POWER MAY VOID POWER-LIMITED LISTING ON THIS CIRCUIT'

6.3.11.8 If your system generates **coded** signals, explain how they are produced and how to interpret them.

6.3.11.9 For all types of terminal connections (telephone type, solderless wrapped, quick connect, push-in, solder, or other types) identify:

a. Any special tools required for connection, including name of manufacturer and model number
b. Range of wire sizes
c. Testing method for an open and a ground fault on circuits to which wiring is connected.

6.3.11.10 Each circuit connected to a field connection should be identified to indicate whether it is **supervised** or **not supervised.** In addition, circuits should indicate:

a. How to connect up supervision components. Be as clear as possible—diagrams and pictures can help convey this information clearly.
b. Intended volts, frequency, and maximum current output or specific power supply to be used
c. Terminal connection of a grounded conductor.

6.3.11.11 For **control unit accessory circuits,** reference the name of the manufacturer, the model number, and connection to the accessory.

6.3.11.12 For **limited energy circuits,** mark 'Power Limited Circuit' for connections to circuits that may be connected to limited energy cable.

6.3.11.13 Mark 'DO NOT USE ALUMINUM CONDUCTORS' next to push-in terminals. (Unless the terminals and approval authorities permit it).

6.3.11.14 Mark 'DO NOT CONNECT' or 'NC' for extra terminals to which field connections are not intended to be made.

6.3.12 Power Supply Specifications

Power supply specifications for fire alarm equipment may have the following special document requirements:

6.3.12.1 All fire alarm systems installed in accordance with NFPA standard 72 require three power supplies:

a. A primary (main) power supply that operates the system.
b. A secondary (standby) power supply that operates the system in the event of a failure of the primary (main) power supply for specified periods of time under maximum normal load and alarm load conditions. The periods of time vary depending upon the type of system and how the system is used.
c. A trouble power supply to operate trouble signals. A trouble power supply must be able to sound trouble signals in the event of a loss of the primary (main) power supply.

Inform the reader that NFPA 72 does not permit a primary battery (dry cells) to be used for this purpose. The secondary power supply may be used for the trouble signal power supply (depending on design).

6.3.12.2 A detailed description of the acceptable sources for each power supply-type for the product. For example:

> "The primary power supply is usually one phase of the commercial 120/240 volt ac electric current available in most buildings, but a correctly-installed engine-driven generator could also be used."

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6.3.12.3 A definition of maximum normal load and maximum alarm load for the product.

6.3.12.4 Where power supply connections are located on each product.

6.3.12.5 A detailed description of how connections should and should not be made.

6.3.12.6 If your company also furnishes separate power supplies such as chargers, batteries, and so on, indicate how these items should be correctly interconnected with other components of the fire alarm system.

6.3.12.7 For secondary (standby) power supplies, list the periods of time under maximum normal load and alarm load conditions (as specified by NFPA standards) under which the power supply will operate the system.

6.3.12.8 If your power supply contains a circuit to switch over to batteries when the primary supply fails, it is a good idea to indicate the voltage at which this switch over occurs. See Appendix A for samples.

6.3.13 Battery Circuits

6.3.13.1 List voltage, DC, and the maximum current input.

6.3.13.2 If a specific type of battery is to be used, indicate model number. If only one battery manufacturer and/or model is acceptable (different manufacturers batteries do exhibit different electrical characteristics) say so clearly and consider giving the reason and/or consequences to enforce your statement.

6.3.13.3 For storage battery to be charged by the control panel, indicate maximum charging currents (trickle and fast charge) and capacity in ampere-hours. If the battery to be used may be selected from a range of sizes, you should provide a simple method of selecting the correct size. Consider including a statement that this selection be performed only by qualified people.

6.3.13.4 No battery has an infinite life. Life of the battery will vary depending mostly on the circuit in which it is installed, but also on a wide range of parameters such as temperature, usage, manufacturer etc. You should make it clear to the reader that battery replacement is expected after a time, and tell him what that time is. Caution to only replace with a compatible replacement and tell him how to obtain one. Advise retesting after battery replacement as with any repair/replace activity.

6.3.13.5 Batteries usually contain caustic chemicals or chemicals harmful to people and the environment. Many cities and towns have ordinances concerning the safe disposal of batteries. Provide general information on their safe disposal, you may wish to provide a reference to the possible existence of local ordinances covering this subject.

6.3.14 Transient Protection

Protecting electronic control equipment against severe transients can be a significant design challenge. Most equipment can be suitably protected, provided the installation is carefully done.

6.3.14.1 Installers should only install suppression devices in accordance with the panel manufacturers instructions. Advise installers not to add ancillary devices to fire alarm circuits as they may interfere with the correct operation of those circuits.

6.3.14.2 For transient suppression to be effective, good ground connections must be provided. Give specific instructions on how to provide these ground connections. You may also consider including a section on ground connections in your testing section, periodically checking the effectiveness of grounding.

6.3.15 Initiating Device Circuits

6.3.15.1 List types of devices that may be used (such as heat detectors, smoke detectors, manual stations, and so on).

6.3.15.2 Describe wiring of smoke detectors or other devices connected in an initiating device circuit so that trouble signal from a particular detector doesn't prevent alarm signals from other initiating devices on the same circuit.

6.3.15.3 You should state the maximum line impedance, unless control unit can operate with a 100-ohm impedance in each circuit.

6.3.15.4 When an alarm bell (notification appliance) silencing switch is used on a local control unit and audible alarm signal is not transferred to another audible signal circuit, make the following notation: 'NOT APPLICABLE FOR CONNECTION OF WATERFLOW ALARM DEVICES.'

6.3.16 Notification Appliance Circuits

6.3.16.1 Types of signaling appliances and connections, include information on connection of supervision components.

6.3.16.2 When circuit is to be connected to polarized appliances, field connections should be marked with + or - symbols to show proper connection.

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6.3.16.3 Some types of panel may use speakers and audio amplifiers for broadcasting an alarm condition. Special conditions may apply to this type of system.

6.3.17 Supplementary Signaling Circuits

6.3.17.1 State maximum current, voltage and frequency

6.3.17.2 When circuit will be energized by separate power supply, show the position of contacts and condition of circuit, supervisory, alarm, or trouble.

6.3.18 Signaling Line Circuits

6.3.18.1 State the maximum line impedance, voltage and frequency.

6.3.18.2 If field adjustment of current is allowed, show current operating range.

6.3.18.3 When a polarity reversal type circuit is used, the following is needed for a remote station unit at the protected premises:

> "INTENDED FOR CONNECTION TO A POLARITY REVERSAL CIRCUIT OF A REMOTE STATION RECEIVING UNIT HAVING COMPATIBLE RATINGS."

6.3.19 Municipal Box Connection

If your panel includes the capability of signaling off-site, some of the following may be applicable.

6.3.19.1 Show type of connection (series or shunt) and resistance value of trip coil and trip current.

6.3.19.2 For shunt type connection, note next to terminal:

> "THE SHUNT CONNECTION IS RECOGNIZED ONLY AS A SUPPLEMENTARY SIGNALING UNIT AS PART OF A LOCAL CONTROL UNIT AND IS NOT RECOGNIZED AS AN AUXILIARY CONTROL UNIT CONNECTION PER NFPA."

There may be other special conditions that apply to off-site signaling systems. There are other types of off-site signaling that may apply to your equipment, for example digital communicators.

6.3.20 Insurance

Installing a fire alarm system may qualify for insurance rebates in some areas. However emphasize that an alarm system is not a substitute for fire insurance.

6.3.21 Electrical Safety

If there are high voltage electrical conditions, statements such as "DISCONNECT POWER SUPPLY BEFORE SERVICING" may be applicable.

6.3.22 Safe Practices

It is worthwhile to include a general reminder that good workmanship and safe installation practices should be used during installation, and at all times when working on or near the system.

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Section 7
DEVELOPING PRODUCT LABELS

7.1 GENERAL

This section provides guidelines you can use when developing product labels. The information contained in this section includes:

- General information pertaining to all product labels.
- Using pictures on product labels
- Using color on product labels
- Using type to impact label readability
- Developing test labels
- Developing operating instruction labels
- Developing suppression system labels
- Developing electrical hazard labels.

Appendix A contains some examples of the labels discussed in this section.

7.2 STANDARDS

A primary reference is ANSI Z535.1-Z535.5, which you are encouraged to study. UL Standard 969, *Marking and Labeling Systems*, also addresses marking and labeling systems.

7.3 GENERAL CONSIDERATIONS

Labels used on fire alarm equipment should:

a. Be permanently affixed to the product so they cannot be removed.
b. Be printed using indelible materials so they cannot be erased.
c. Be designed to last the life of the product.
d. Indicate the name and model number of the product to which the label pertains
e. Be designed to fit on the product (which might limit the space in which information or pictures can appear).
f. Provide safety information or other information intended to eliminate or reduce any hazard associated with the use of the product. For example, the label should instruct the owner/operator of the building to read the product owner manuals for important information on the operation and maintenance of the product.
g. Instruct users to periodically inspect and clean the label to maintain good legibility.
h. Instruct users to replace the label when it is no longer clearly legible.
i. Provide instructions on how to order spare parts or additional documentation for the product, including the model number of the product and the name and address of the manufacturer from which parts or documentation can be ordered.
j. Recommend that a product label and documentation be provided to each occupant in locations protected by the equipment.
k. Provide any information required by the regulatory agency or authority having jurisdiction.

7.4 USING PICTURES

Use pictures whenever possible to communicate a message without the use of words. This helps to ensure that observers with limited reading ability will understand the message.

Consider the following items when using pictures:

a. When using a safety alert symbol (a triangle surrounding an exclamation point, conforming to SAE J284a, which indicates potential personal safety hazard), the symbol should precede the signal word, should be on the same horizontal line as the base of the letters of the signal word, and the height of the safety alert symbol should equal or exceed the signal word letter height.
b. Insure that pictures or symbols will immediately be recognized by the observer as an indication of hazard.
c. Test and evaluate the effectiveness of the picture in conveying the intended message before using the picture. Adopt a standard visual layout for product labels and signs applied to a wide variety of products and use it consistently.
d. Be aware of any federal, state, or local government codes, regulations, standards, or guidelines that specify the use of a particular signal word. A signal word such as caution, danger, and warning identifies the degree or level of hazard.
e. Ensure that the sign or label will be distinctive on the product. Consider using a contrasting border or other method of calling attention to the label.
f. If multiple hazard situations are to be addressed on one label, and the hazards are classified at different levels of seriousness, use the signal word corresponding to the greatest hazard level.
g. Ensure that the text of any written messages is concise and readily understandable.
h. Separate multiple messages by a full space whenever possible to ensure clarity.

7.5 USING COLOR

When using color on a product label, consider the following items:

a. Pictures should typically consist of a black pictorial image on a white background.
b. Use other colors for emphasis, such as red to indicate fire.
c. On a danger sign or label, the word DANGER shall be in white letters on a red background.

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d. On a warning sign or label, the word WARNING shall be in black letters on an orange background. On a caution sign or label, the word CAUTION shall be in black letters on a yellow background.
e. Use of other colors should comply with the standards defined in the ANSI Z535.4, *Product Safety Signs and Labels.*

7.6 LETTER STYLE AND SIZE

To enhance readability of your labels, consider the following suggestions:

a. Use sans serif letter styles, such as Medium, Folio Medium, New Gothic Bold, or Helvetica Bold, to enhance readability.
b. Signal words (WARNING, DANGER, CAUTION) shall be in upper case only.
c. The body of the message text can be a combination of upper and lower case letters.

Ensure that lettering size enables an observer with normal vision, including corrected vision, to read the label at a safe viewing distance from the hazard. Safe viewing distance takes into consideration a reasonable hazard avoidance reaction time.

7.7 DEVELOPING TEST LABELS

A test label is a label that contains information about required testing of the fire alarm equipment. A test label should:

a. Indicate when the equipment must be tested. For example, after original installation, upon acceptance testing, and following any subsequent modification or addition.
b. Indicate where to find the testing instructions.
c. Instruct the person conducting the test to thoroughly read the testing instructions prior to conducting the test.
d. Indicate any conditions under which the testing must be performed, such as according to the authority having jurisdiction or the testing schedule outlined in the NFPA 72H.
e. Instruct the person conducting the test to notify the fire department, central station, and building occupants before conducting any tests.
f. Instruct the person conducting the test to maintain a record of all tests conducted, which provides supporting information that tests were conducted on schedule. The test record can also be used to detect potential system problems.
g. Instruct the person conducting the test to call the service agent if any physical damage to the panel or any initiating or indicating devices is detected during the test.

7.8 DEVELOPING OPERATING INSTRUCTION LABELS

Labels designed to provide operating instructions pertaining to the fire alarm equipment should be written clearly using simple words. In addition, your operating instruction labels should:

a. Be understandable to readers with no more than a sixth grade education.
b. Indicate the function of lights and switches.
c. Indicate how to obtain service by providing the name and address of the local service agent.
d. Indicate that service must be performed by a qualified service agent using exact replacement parts according to the instruction manual.
e. Indicate the date on which the instructions were issued.

7.8.1 Indicating the Condition of a Panel

You can use an operating instruction label to show how to determine the current condition of a panel.

7.8.1.1 NORMAL CONDITION

Indicate that normal condition means the green "AC" light is on and all lights and sounders are off.

7.8.1.2 ALARM CONDITION

a. Indicate that alarm condition means the red "ALARM" light is on and a warning noise can be heard.
b. Tell the reader to follow established emergency procedures, such as notifying the fire department and evacuating the building.
c. Tell the reader **not** to silence the alarm until given permission to do so by an authorized person and it is safe to do so.
d. Tell the reader to complete the following steps to silence the alarm:
   1. Unlock and open the cabinet door.
   2. Operate the "SILENCE" switch to silence the alarm bells, horns, or other indicating device. NOTE: Indicate that systems with sprinkler (waterflow) alarms cannot be silenced until the waterflow is stopped.
   3. When the cause of alarm has been corrected, reset the control panel by operating the "RESET" switch.
e. Tell the user to contact the qualified service agent to check and test the system after an alarm to ensure the equipment is in correct working order.

7.8.1.3 TROUBLE CONDITION

a. Indicate that trouble condition means the yellow "TROUBLE" light is on and the trouble buzzer is on.
b. Tell the reader to notify a qualified service agent immediately.

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c. Tell reader to not leave the panel in a trouble condition because the fire alarm might not be working correctly. This could prevent the fire alarm system from being able to perform its intended function, which could result in loss of life should there be a fire.
d. Tell reader what steps to complete to silence the trouble buzzer; for example:
   1. Unlock and open the cabinet door.
   2. Operate the "TROUBLE SILENCE" switch to silence the trouble buzzer. Indicate that the trouble light will stay on until the problem is corrected.

7.9 DEVELOPING ELECTRICAL HAZARD LABELS

Labels warning against electrical hazards should:

a. Be placed on the outside of any enclosure containing dangerous voltages or other electrical hazards.
b. Tell user to disconnect electrical power before servicing the equipment.

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Appendix A
DOCUMENTATION SAMPLES

A1.1 GENERAL

This appendix contains specific examples of text that can be used in installation and operation manuals and product labels. The samples are presented only as examples. They are not intended to imply any required arrangement of words nor do they represent any manufacturer's specific product. These examples are not necessarily complete, your product will probably need additional text description.

A1.1.1 Providing Basic Product Description

Example:

To help avoid incorrect installation and/or operation, the following precautions must be strictly observed.

- Follow all instructions in this manual. DO NOT DEVIATE.
- Comply with all codes and standards set forth by the authority having jurisdiction.
- DO NOT assume any installation details not shown in this manual.
- DO NOT alter any mechanical or electrical features of the equipment supplied.

A1.1.2 Standards Conformance Samples

Example:

The *product name* system complies with the NFPA requirements for: "Sprinkler Supervisory" conditions and for supervised auxiliary control functions required by the Life Safety Code 101.

Example:

The equipment is listed by Underwriters Laboratories for use in fire alarm signaling systems. Use only components which are compatible with the *product name* system. The installation must be in accordance with the instructions in this manual.



Improper installation, application, or operation can result in death or serious injury.

Example:

The *product name* system contains Power Limited circuits. You cannot connect external sources of power to these circuits without invalidating their approvals.

A1.1.3 Document Must Remain With Equipment

Example:

These instructions must remain with the fire alarm system at all times. If building ownership is changed, this manual, including testing and maintenance information, must be passed along to the new owner(s). The fire alarm panel is part of a system, manuals and instructions for other devices forming part of the system should be kept together. Purchasers who install this system for use by others must leave the instructions with the user.

A copy of these instructions is included with each product and is available from the manufacturer.

A1.1.4 Environmental Considerations

Example:

It is important that the *product name* be operated within its specifications.

Environmental:

- Recommended operating temperature range: to ___degrees F (___to__ degrees C)
- Absolute maximum operating temperature range: to__ degrees F (___to___degrees C)
- Operating humidity not to exceed___percent, non-condensing

And so on...

A1.1.5 Wiring

Example:

The installer must make sure that the wiring and devices installed in the system meet the current National Electrical Code, NFPA 70, and state and local building code requirements.

- Use the conductor size required by local codes. (see NFPA 70, Article 760). Wiring resistance should not be more than that shown on the field wiring diagrams.
- Use conductor type required by local codes (see NFPA 70, Article 760).
- To prevent the spread of fire, use proper patching materials to areas where system wiring passes through fire-rated walls or floors.

Example:

Check that you have all the equipment you need to complete the installation. Follow the Field Wiring Diagrams and Installation Notes at the end of the manual.

Example:

To reduce errors and help in servicing the system, all conductors should be tagged, or otherwise coded and logged at installation, to identify circuit assignment, polarity, and whether the wiring is outgoing or return. If the conductors are logged with a code, keep the log that explains the code with the manual, so it is available to other people working on the panel.

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Example:

Ground wires must be free from shorts or grounds and extraneous voltages. You may need to use a high voltage insulation tester with this type of cable. There should be a minimum of__Megohm resistance between the conductor and ground.

Example:

All__circuit wiring must not exceed__milliHenry inductance or__microFarad capacitance. Check each__ circuit with a LHR meter before connecting to the panel and note the inductance, capacitance and resistance of each__circuit in the installation manual for future use. If you do not have an LHR meter, a suitable one can be obtained from__under the part number__.

Example:

All system wiring subject to physical damage must be adequately protected. Provide a separate back box for each bell, horn, pull station, smoke detector, etc. When using metallic conduit, the continuity of which is not maintained, a 12 AWG drawn wire (ground) must be connected in the break between the conduit installation.

Leave adequate slack in the wiring to simplify troubleshooting. Provide a minimum of 6 inches free conductor in each electrical box for terminations. A 12-inch service loop is required for all continuous wire pulls through an electrical box.

All wiring splices and terminations must be made with devices listed by UL for that purpose. Wiring terminated by twisting and covering with electrical tape IS NOT ACCEPTABLE.

When the installation uses approved fire alarm cable, all cables entering an electrical box must be provided with strain relief.

Example:

Pay special attention to proper grounding practices. At no time should this system be connected to a conduit or green wire circuit that is also used to power resistance heating, motors, fans, air conditioning equipment, or fluorescent lighting circuits, since leakage currents into the ground return could damage sensitive system components.

A separate earth ground or cold water pipe with properly bypassed water meter should be used. All external devices, such as horns or alarm bells, should have their housings grounded.



IMPORTANT: Terminate ground wire on green screw inside fire alarm panel backbox.

Example:

Most supervised circuits use voltage or current sensing circuits which are very sensitive to induced voltages on the sensor wiring. Therefore, **DO NOT** under any circumstances run AC power, speaker, P.A., intercom, or switch control wiring with inductive loads, in the same conduit or in the immediate vicinity of the sensor wiring. Do not run bell/horn or other indicating device wiring in the same conduit as sensor wiring. Maintain at least__feet from other services and__feet from fluorescent lighting ballasts.

When the installation uses plastic pipe, plastic raceway or approved fire alarm cable, keep at least__feet away from every heat radiating light fixture.

Carefully read and understand all applicable installation notes referred to in the Field Wiring Diagrams

A1.1.6 General Installation Information

Example:

The wiring information in this section is intended to serve as a guideline for the installer to help support safe and trouble-free installation. However, it is not the intention of these guidelines to bypass any codes or regulations set forth by the authority having jurisdiction.

Example:



Installation of this fire alarm system must be approved by the authority having jurisdiction and be installed by qualified personnel with a knowledge of applicable NFPA, state, and local codes.

Example:

Some states and cities have a legal requirement that installers be licensed to operate in that area.

It is the responsibility of the installer, being knowledgeable and trained in installation of fire alarm systems, to ensure this equipment is installed in a competent manner consistent with industry standards and good practices.

A2.1 INITIATING DEVICES

A2.1.1 When to Use Other Detectors

Example:

In certain circumstances where smoke detectors are unsuitable, special-purpose detectors (such as flame detectors, heat detectors, and other detection devices) may be suitable.

The application of these special types of detectors should be based on an engineering survey. They should be used in accordance with the manufacturers' installation instructions provided.

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A2.1.2 Limitations

Example:

Smoke detectors offer early warning of fire. They have saved thousands of lives in the past and will save more in the future. Nevertheless, smoke detectors do have limitations. They may not provide early warning of a fire developing on another level of a building. A first-floor detector, for example, may not detect a second-floor fire. For this reason, detectors should be located on every level of a building. In addition, detectors may not sense a fire developing on the other side of a closed door. In areas where doors are usually closed, detectors should be located on both sides of the door.

Because fires develop in different ways, and are often unpredictable in their growth, a given detector may not always provide significant advance warning of fires when fire protection practices are inadequate, nor when fires are caused by violent explosions, escaping gas, or improper storage of flammable liquids such as cleaning solvents, etc.

Example:

Rate of Rise heat detectors may be subject to reduced sensitivity over time. For this reason the rate of rise feature of every detector should be checked at least every ___by a qualified fire alarm technician.

A2.1.3 Placement and Spacing

Example:

One of the major causes of nuisance alarms is improper placement of detectors. The best way to avoid nuisance alarms is to not install detectors in environments that can cause them to malfunction. Examples are given below:

- In excessively dusty or dirty areas
- Outdoors or in open structures affected by dust, air currents, or excessive humidity and temperature.
- In damp or excessively humid areas
- Elevator lobbies—do not place over ash trays or where people will smoke while waiting for elevator.
- In very cold or very hot environments; for example, unheated buildings or rooms.
- In or near areas where combustion particles are normally present, such as in kitchens or other areas with ovens and burners.
- In or near areas where substantial quantities of flammable vapors, gases, or fumes may be present.
- Insect-infested areas.
- Near fluorescent light fixtures.

Example:

Additional information on placement and effectiveness of duct detectors is contained in the NEMA *Guide for Proper Use of Smoke Detectors in Duct Applications*, available from National Electrical Manufacturers Association, 2101 L Street, N.W., Suite 300, Washington DC.

A2.1.4 Compatibility

Example:

Before connecting these detectors to a control panel make sure they are listed as being compatible with the appropriate panel initiating circuit.



Only detectors listed by a Nationally Recognized Testing Laboratory as compatible with the panel may be connected.

A2.1.5 Zoning

Example:

The faster the source of an alarm can be pinpointed, the sooner action can be taken. Although formal rules for zoning are not given in fire protection codes, except for wireless devices where each smoke detector must be individually identified, it is always sensible to zone any system that contains more than a small number of detectors. Experienced detector installers and system designers recommend the following:

- Establish at least one zone on every protected floor.
- Zone natural subdivisions of a large building, such as separate wings on a single floor.
- Minimize the number of detectors in each zone. Fewer detectors on a zone will speed up locating the fire and simplify trouble-shooting.
- Install duct detectors in different zones than open-area detectors for troubleshooting and locating purposes.

See also NFPA and UL.

A2.1.6 Maintenance

Example:

Approximately every__months, more frequently if the environment is dirty, the detector should be cleaned by vacuuming around the outside with an ordinary vacuum cleaner hose. The body of the detector can be wiped with a soft damp cloth.

Example:

It is recommended that detectors be replaced every__ years.

- Dirt, dust and contaminants in the environment can affect the performance of the detector over a period of time.
- The technology of smoke detection is improving, together with changing standards and codes.

Also see NFPA 72E, *Automatic Fire Detectors*.

A3.1 NOTIFICATION APPLIANCES

The following text examples are related specifically to notification appliances.

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A3.1.1 Define and Describe

Example:

Notification appliances are audible (such as bells, horns, chimes, buzzers, or speakers) or visible devices (such as strobes or lamp-types) used to signal an alarm condition.

Example:

Alarm notification appliances such as bells, horns, chimes, buzzers, or speakers are connected to a control panel indicating circuits to signal an alarm condition. Visible indicators such as strobes and lights may also be used, particularly in areas of high noise levels, and/or where required by the authority having jurisdiction.

Alarm notification appliances should be installed in accordance with local codes, manufacturer's recommendations, NFPA installation standards, and the authority having jurisdiction.

A3.1.2 Limitations

Example:

Audible warning appliances such as horns may not alert people or wake sleepers if they are located on the other side of closed, or partly open doors, or are located on another floor of a building.

Example:

Audible and visible notification appliances may not be heard or seen in all cases. Sound and light can be blocked by walls, doors and other obstacles that may temporarily or permanently impede the output of the appliances. Sound and light are also reduced by distance and masked by background noise or light. The output of these devices may not be sufficient to alert all occupants, especially those that are asleep, those that have impaired hearing or vision, those that are wearing hearing or eye protection devices and those who have recently used drugs or alcohol.

Example:

Notification appliances will not work without a compatible control panel that controls the activation of the appliance and provides proper voltage and current. The electrical ratings of the control panel must be compatible with the ratings of the notification appliance and the equipment must be properly interconnected.

A3.1.3 Installation

Example:

Do not paint the notification appliance. Paint can prevent the proper operation of the device.

Example:

Make sure backboxes are not contaminated with dust or particles from construction activities. Dust can interfere with the operation and reduce the life of the notification appliance.

Example:

If the appliance is labeled for a particular use (such as **FIRE** or **HALON** on a strobe lens) do not use for other applications.

A3.1.4 Safety

Example:



Some notification appliances, such as strobes, store high voltage charges even after the appliance is disconnected from the circuit. Do not touch exposed circuitry.

A4.1 CONTROL PANELS

The following examples are specific to control panels.

A4.1.1 Panel Description

Example:

The purpose of a Fire Alarm Control Panel is to provide control over the initiating devices (smoke detectors, heat detectors, pull stations, etc.) and notification appliances (bells, horns, etc.) in a fire alarm system. The control panel monitors the status of the system's initiating appliances for evidence of alarm or trouble conditions. In alarm, the control panel automatically activates the systems notification devices (and signals a remote monitoring station, if so connected).

Example:

The *product name* is a fully assembled, self-contained, fire alarm system that provides all the necessary alarm/control functions and programmability to meet a wide variety of industrial, commercial, and institutional applications. The *product name* is UL listed and Factory Mutual approved for use in systems meeting the following NFPA.[1]

- NFPA 71—Standard for Central Station Signaling Systems
- NFPA 72—Standard for Protective Signaling Systems

Example:

These instructions are applicable only to U.S. panels installed within the U.S.A.

1 National Fire Protection Association, One Batterymarch Park, Quincy MA 02269, USA.

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A4.1.2 Product Specifications

Example:

Control Board—Technical Data

- Operating voltage:___VDC
- Operating Amps in normal condition:___Amps
- Operating Amps in trouble condition:___Amps
- Operating Amps in alarm condition:___Amps
- Maximum field wiring resistance:
  - — Initiating circuit—100 ohms
  - — Notification device circuit—See Tables 5-1 and 5-2
- Maximum alarm current, each zone:___Amps
- Minimum alarm current, each zone:___Amps
- Maximum standby detector current available for each zone: __Amps
- Suitable for smoke detectors or contact devices—See Table 4-1.
- Temperature limit: ___to ___degrees C (__to__degrees F)
- Humidity limit: Up to___% relative humidity (non-condensing)

Power Supply/Battery Charger—Technical Data

- Output rated___Amps at___VDC
- 120 VAC input @ 60 Hz,___Amps maximum fused
- Maximum ripple voltage:___volts P- P.
- Minimum operating AC input voltage: ___volts
- Maximum operating AC input voltage:___volts
- AC input power consumption under normal conditions: ___Amps
- Power consumption under trouble conditions:___ Amps
- Maximum battery charging current: ___Amp
- Maximum battery charger voltage output: __volts

Example:

The *product name* has a basic capability of __, Style B (Class B) or Style D (Class A), initiating (input) zones, and one common Class Y notification (output) zone. The system may be expanded by the addition of zone expansion and auxiliary function boards.

The system provides for alarm resound in the event of subsequent alarms and audible ring-back type trouble sounder. All audible alarm output circuits are supervised for open and short circuit conditions. The circuits monitoring waterflow switches are field-selectable, so they cannot be silenced if this is required by the authority having jurisdiction (AHJ).

A4.1.3 Normal Operation

Example:

The panel is in its normal condition with the green AC ON light on and all other lights and sounders off.

Example:

A set of operating instructions is included with the *product name* panel. Frame these instructions and mount them next to the control panel.

A4.1.4 Alarm Condition

Example:

The panel is in an alarm condition when the red **ALARM** light is on and a warning sound is heard.

Follow established emergency procedures for notifying fire department, evacuating building, etc.

When told by an authorized person that there is no hazard and it is safe to do so . . .

1. Unlock and open the cabinet door.
2. Operate the "ALARM SILENCE" switch to silence the alarm bells, horns, etc.

   NOTE: Systems with sprinkler (waterflow) alarms cannot be silenced until the waterflow is stopped (unless the authority having jurisdiction has determined otherwise).
3. When the cause of the alarm has been corrected, reset the control panel by operating the "RESET" switch.

After an alarm condition, notify the qualified service agent to check out and retest the alarm system.



Do not SILENCE or RESET the panel until it has been positively confirmed that there is no fire hazard.

A4.1.5 Trouble Condition

Example:

The panel is in trouble when a yellow "TROUBLE" light is on and a trouble buzzer sounds. To operate the panel in this condition:

1. Notify qualified service agent immediately (including the fire department or central station if applicable).
2. Unlock and open cabinet door and silence the trouble buzzer by operating the "TROUBLE SILENCE" switch. The trouble light will stay on until the problem is corrected.



WARNING: Do not leave the panel in a trouble condition. The fire alarm may not work properly, causing lives to be lost in the event of a fire. If the fire alarm system is not operating properly it may be unable to perform its intended function.

A4.1.6 Limitations

Example:

Detectors connected to zones which are in a fault or trouble condition, may not respond to a fire, and may not alarm the control panel. Sounders and alerts which are connected to notification (indicating) circuits which have a

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fault or trouble condition, may not signal an alarm condition.

Example:

Telephone lines needed to transmit fire alarm signals to a central receiving station, monitoring facility or fire department may be out-of-service or temporarily disabled, in which case the alarm will not be transmitted.

Example:

All automatic fire alarms systems equipment will not operate without power. If AC power fails, the system will only operate from stand-by batteries for a specified number of hours. Then, it will not operate or provide any fire protection until AC power is restored.

Example:

When AC power is first connected to a system with a completely discharged battery, the battery will take approximately__hours to fully charge. During this time the fire panel will not be able to operate on the battery for its full rated time.

A4.1.7 Installation

Example:

Take care in planning the control cabinet location. The cabinet is for use only inside buildings which are free from exposure to rain, condensation, excessive dust, moisture, or other airborne contamination. Locate the cabinet in a low risk area (preferably on the ground floor near a building exit) for the safety of the control panel operator who may be the last to leave in the event of an emergency.

According to requirements of NFPA 72 *Installation, Maintenance and Use of Protective Signaling Systems*, the system must not be subjected to ambient air temperatures below 32° ±4° F (0° ± 2°C) or above 120° ± 4°F (49° ± 2°C), for a minimum duration at each extreme of 3 hours. Humidity (RH) should not exceed __% (non-condensing). The system must not be installed in an environment outside these limits.

Plan cabinet location to permit free access to sides, top, and/or bottom for conduit entry. Where bottom entry is used, make sure conduit or wire does not interfere with battery location. Also, make sure there is full clearance for the 180 degree swing-out door and adequate working space for future operation and system maintenance. Mount the cabinet at a height that the lights can all be seen clearly and the switches can be reached by all the people who may need to operate them.

Example:

The AC input wiring should be from a separate branch circuit supplied through a fuse or circuit breaker connected to building mains ahead of all other disconnect devices. Be sure the ground conductor connects directly back to the building earth ground and that, if this is a connection to the water service, the water meter is properly bypassed.



If water mains are non-conductive (PVC, etc.) make sure a separate ground is provided.

Securely connect the incoming AC line to the primary side of the cabinet-mounted power transformer. Provide an earth ground to terminal___on terminal block___of the power supply. **DO NOT** apply AC power at this time.

Example:

External Wiring Checkout Procedure:

The following procedure is recommended to help ensure a trouble free system start-up. **Make sure that AC and battery power are NOT connected.**

a. Disconnect wiring to earth ground. Using an ohmmeter check the resistance of each conductor lead, one at a time, to earth ground to verify that no conductor is grounded. The conductor to ground resistance should be very high (at least megohm).
b. Check 'Style B' initiating circuits with an ohmmeter to ensure that the ohm, UL listed EOL (end-of-line) resistor is in place.
c. Before terminating wiring, check 'Style B' notification (indicating) circuits to ensure the ___ohm EOL resistor has been properly installed. If the reading is less than___ohms, reverse the meter leads and check again. You should see a ___ohm reading in one direction and a value less than___ohm in the other. If both readings are less than ___ohms, then one or more indicating devices are connected with the wrong polarity. The lower resistance reading will depend on the number of devices connected in the circuit, but should be approximately ___ohm. Actual field experience has shown that the most common problems can be traced to improper installation of initiating devices and notification appliances. Often, an improper wiring technique resulting in an open or shorted circuit, missing EOL resistors, or incorrect polarity, is the culprit.

Example:

Protect incoming power wiring by separate fused disconnect or circuit breaker. See wiring diagrams for specific input current ratings.

The incoming AC voltage should be stable and within the specified voltage range. This is especially important in construction projects where incoming power may be high or unstable, with temporary connections often causing large inductive voltage spikes. Voltage fluctuations outside the specified range may damage the panel and jeopardize its operation as a fire protection device.

Leave adequate slack in the wiring to simplify troubleshooting.

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All wiring splices should be made with devices listed by UL for that purpose.

Earth Ground Fault Detection: Pay special attention to proper grounding practices. The power supply/battery charger and AC input should use an isolated ground circuit, **not conduit ground**. At no time should this system be connected to a conduit or green wire circuit that also is used to power resistance heating, motors, fans, air conditioning equipment, or fluorescent lighting circuits, since leakage currents into the ground return could damage sensitive system components.

A separate earth ground or cold water pipe with properly bypassed water meter should be used. External devices, such as horns or alarm bells, should have their housings grounded.

Most supervised circuits use voltage or current sensing circuits which are very sensitive to induced voltages on the sensor wiring. Therefore, **DO NOT** under any circumstances run AC power, speaker, P.A., intercom, or switch control wiring with inductive loads, in the same conduit or in the immediate vicinity of the sensor wiring. Do not run bell/horn or other indicating device wiring in the same conduit as sensor wiring.

Carefully read and understand all applicable installation notes referred to in the Field Wiring Diagrams.

Example:

Installation procedures should be performed in the sequence outlined below for the most efficient use of time and least likelihood of accidental damage to equipment. Installation details are covered in subsequent paragraphs and should be followed closely.

a. You should have a carefully laid out drawing of the complete system wiring hookup. This drawing should be secured inside the panel, or in an otherwise secure location, for future reference.
b. Mount equipment cabinet securely. Remove electronics while installing cabinet, conduit, pulling wires, etc. Clean cabinet before reinstalling.
c. Take care not to damage fragile electronic components. Keep electronics clean and free from dust and dirt. Handle static sensitive components according to the instructions — failure to do so could cause them to fail and jeopardize the fire alarm system.
d. Complete all conduit connections to the panel.
e. Pull all system wiring through conduit. **DO NOT make connections at this time!**
f. Install chassis and subassemblies.
g. Check the integrity of the field wiring—follow the "External Wiring Checkout Procedure" in this section before connecting wiring to the terminals.
h. Connect wiring to appropriate terminals as outlined in the installation drawings prepared by yourself or the seller/supplier, if applicable.
i. Perform operational test as outlined under "Testing the System."
j. Prevent false alarms. Notify the fire department, monitoring facility, building occupants, etc., before testing the system.

Observe safety precautions!



NEVER connect or disconnect wiring or circuit boards with AC or DC power (including batteries) applied.

Only install suppression devices in accordance with the instructions in this manual. Do not add ancillary suppression devices to initiating circuits or communication circuits, as they may interfere with the proper operation of the fire alarm.

A4.1.8 Batteries

Example:

When supplying battery power for emergency conditions, it is necessary to know how much energy the system will consume during the period of primary power loss. Since the battery voltage remains somewhat constant, the battery standby capacity is calculated in terms of ampere-hours (Amperes × Time = A.H.).

To determine the capacity, the total anticipated current consumption of the system in normal (standby) mode must be multiplied by the length of time the system is expected to function without AC power. (Refer to NFPA Codes and Standards.) To this quantity must be added the total current consumption of the system while in alarm, multiplied by the time the system must be able to support the alarm condition without AC power.

NOTE: Be sure to check with the authority having jurisdiction for required standby and alarm times.

Operating power for all initiating and notification devices is provided by the power supply. Also, any externally connected 4-wire smoke detectors can be powered from the switched DC voltage output terminals. The distribution of such loads must be carefully planned before proceeding with system installation.

The DC load calculations shown in Table A-1 should be performed to determine if the power supply is capable of providing the total system current demand. Also, the calculations will provide the minimum ampere-hour standby battery capacity required for alarm and standby conditions as outlined by applicable NFPA codes.

Refer to the appropriate tables for initiating device and indicating device current requirements. NFPA 72 requires 24 hours of standby operation for local and proprietary systems, 60 hours of standby operation for auxiliary and remote station systems.

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Table A-1
Battery Capacity Calculation Worksheet

Device Type	No. of Devices	Current Per Device	Total Device Current	Standby and Alarm Current
1. Board 1	____	____	____	____
2. Board 2	____	____	____	____

Example:

Batteries have a finite life — replace them in accordance with manufacturer's recommendations. Replace them at least every ___years. If the system has been subjected to severe battery stress, replace them more frequently. If batteries are physically damaged replace immediately. Replace only with the same type and manufacture battery. Replacement batteries are available from ___under part number __
Example:

Dispose of batteries properly. Most batteries contain chemicals that are caustic and/or poisonous.



Do not allow the content of batteries to come into contact with skin. Do not ingest, contents are poisonous and corrosive.

Some state and local authorities have rules concerning the disposal of batteries.

A4.1.9 Testing Procedure

Example:

This system must be regularly tested in accordance with NFPA standards and your local requirements (contact your local fire department or building inspector if you are unsure of the local requirements). Testing instructions are located on a separate label located inside the panel door.

Example:

Table A-2 lists a recommended sequence of tests and the responses that should be observed. For systems with the optional City Box and Reverse Polarity Transmitters, see 'Testing Systems with City Box and Reverse Polarity Transmitters' on the next page. After each test, unless otherwise indicated, restore the system to normal condition before proceeding to the next test.

Example:

If your system has both City Box and Reverse Polarity Transmitters, complete the following tests on one transmitter at a time.

NOTE: If you want to test the system without alerting the City or Monitoring Facility, operate the 'Disconnect' switch.

a. Activate an alarm initiating device.
   - The City Box Transmitter 'Active' LED lights.
   - The Reverse Polarity Transmitter 'Alarm' LED lights.
   - The System Alarm and Zone Alarm LEDs light.
   - All indicating devices activate.

b. Operate as many devices as determined by the authority having jurisdiction, and silence/reset the system after each test.
c. After testing make sure all city, or other signaling circuits, are restored to normal.
d. Notify the city or monitoring facility and appropriate personnel when the tests have been completed.

NOTE: To check that the alarm is sent properly to the receiving station (fire department, monitoring facility, etc.), initiate an alarm with all switches in the normal position. Make sure the proper alarm is received at the receiving station.

A5.1 PRODUCT LABELS

Labels that you use on fire alarm equipment should be:

- Non-removable
- Indelible
- Designed to last the life of the product.

See ANSI standard Z535.4, *Product Safety Signs and Labels*, for information on recommended label design.

A5.1.1 Testing

Example:

This panel must be periodically tested to ensure its operation has not been impaired. It should also be tested upon completion of the original installation; i.e., acceptance testing, and following any subsequent modification or addition. The testing instructions should be located in or adjacent to the control unit.

Test the system as required by the authority having jurisdiction (contact your local fire department or building inspector if you are unsure of the local requirements). As a minimum, follow the recommended testing schedule outlined in NFPA 72H.

The person conducting the tests should have a copy of the product manual and should study it carefully before conducting any tests.

NOTE: Notify the fire department, central station, and building occupants both before and after testing.

If there is any physical damage to the panel or to any initiating or indicating devices call the service agent.

A5.1.2 Hazard Labels

A label should be placed on the outside of any enclosure containing dangerous voltages:

Example (See Figure A-2):

WARNING

Signal Word—Black Lettering/Orange Background

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Safety Alert Symbol—Black Triangle/Orange Exclamation Point

Word Message—Black Lettering on White Background or White Lettering on Black Background

WARNING ELECTRICAL HAZARD—Disconnect electrical power before servicing equipment to avoid electrical shock.

A5.1.3 User Warning

Example:

Manufacturer recommends a label/notice be posted and/or a document be provided to each occupant in locations protected by the equipment, advising occupant of risks, and procedures to minimize those risks.

Table A-2
RECOMMENDED SYSTEM CHECKOUT PROCEDURE

Test Action	Where	LED Legend	Response	
			LED Stat.	Other
Disconnect 120/240 VA	Control board	AC ON	OFF	Fault buzzer sounds and battery fault LED lights
		System Fault	ON	
Move alarm silence switch to the 'silence' position	Control board	Alarm Silence	ON	Fault buzzer sounds
		System Fault	ON	
Move trouble silence switch to the 'silence' position	Control board	Fault Silence	ON	Fault buzzer sounds
Place jumpers across terminals___and___ .	Control board	System Alarm	ON	Activates alarm
Repeat for terminal__ and___ .		Fire Zone Alarm	ON	
Initiate an alarm in one zone.	Zone Expansion Boards	System Alarm	ON	Activates alarm
		Fire Zone Alarm	ON	

The system should be retested on a regular basis. Regular testing and cleaning of detectors and other devices is required.

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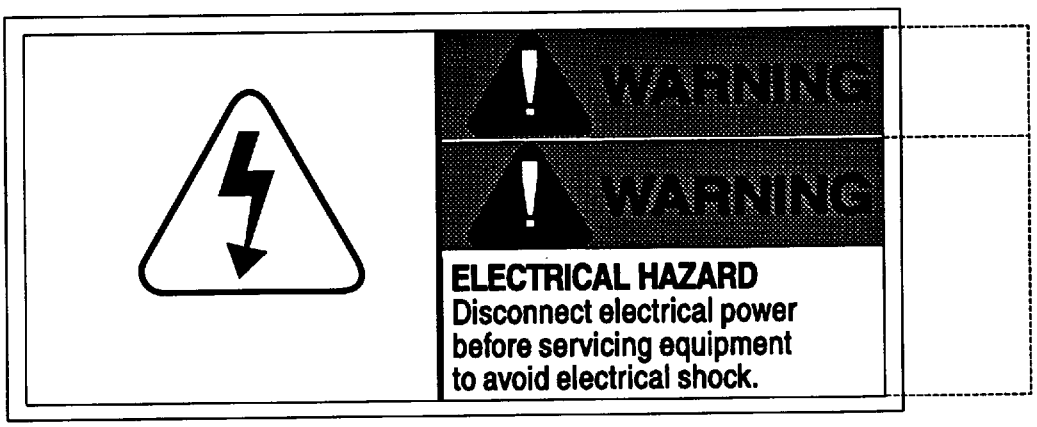

Figure A-1
SAMPLE WARNING LABEL

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Appendix B
RECOMMENDED DOCUMENT ORGANIZATION AND STYLE

B1.1 This appendix contains suggestions on how to organize and write product documents to ensure maximum usability. This appendix is not designed to teach you how to be a good technical writer, but instead places the emphasis on important facts to consider when developing product documentation. If your company has any specific guidelines on document organization and layout, use the information contained in this section as a supplement to your company guidelines.

This appendix provides information about how to:

- Structure a document so it contains all of the necessary information in a logical format and organization.
- Use good writing techniques to ensure that the information is presented as clearly and concisely as possible.

B2.1 DOCUMENT SECTIONS

Consider structuring each document you develop so that each will contain the same basic document sections. This helps to maintain consistency from document to document so that your readers will always know where to look for certain types of information.

Depending on the scope of the document you are developing, you documents could contain the following sections:

- Title page
- Copyright page and edition notice
- Revision history
- Table of contents
- List of illustrations
- Chapters with examples and illustrations
- Appendices
- Glossary
- Index
- Reader Comment Form

You may need additional sections in your document, but you can use this checklist as a base. This guide contains most of the sections listed, so you can use it as an example when you develop your own documents.

Your document may cover a simple subject so that its total size is only a few pages in length. Try to apply the same philosophy however short your document.

B2.1.1 Title Page

Your company probably has standards for title pages. If not, following is a list of items that are normally included:

- Document title
- Publication number
- Publication date
- Name and version number of product to which the document pertains
- Corporate logo

The document title should clearly state the product for which the book was written and the overall purpose of the book. For example, the title *Acme Fire Alarm Model 999 Installation Guide* makes it obvious at a glance that the book tells how to install Acme fire alarm model 999.

Remember to update the title page when you update the document.

B2.1.2 Copyright Page

The copyright page should comply with your company's standard legal notice required for specific types of fire alarm equipment. Your copyright page might contain:

- Your company's name
- The year in which the product was initially distributed and the year when the revised product was first distributed. For example,

  Copyright 1989, 1990 XYZ Company

  Indicates that XYZ Company first distributed the product in 1989 and a revision was distributed in 1990.

  If there are revisions in so many years that it would be difficult to list all the years, generally you should list the first year of distribution, the last year of distribution, and any other years in which revisions of major importance were made.
- Specific information about the product to which the book pertains, such as the model number and warranty information.
- A warning that the contents of the document are important, the product must be installed in accordance with the installation manual, the product must be used in accordance with the guidelines established in the user manual, and the document must be kept with the product at all times.
- Any legal implications associated with the use or reproduction of the book.
- Information on ordering additional copies.
- Instructions for sending comments about the book to you for use in future revisions. If you choose not to include a postage-paid reader comment form in your document, you should list the address to which comments should be sent.

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B2.1.3 Preface

The preface explains the purpose and value of your document. After reading the Preface, the user will know if the document meets her or her needs and whether to read on.

The items usually contained in a Preface are:

- Document objectives — What will the book do for the reader? What are the limitations of the book?
- Intended audience — Who are you writing for and what level of expertise do you expect them to have? Tell your readers early on if they know enough (or too much) to appreciate your book.
- Document organization—What are the document's major topics? Briefly walk the reader through the table of contents, describing the goals of each section. You don't need to list each section if similar sections could be easily described in a brief synopsis.
- Supplemental information — Identify prerequisite and suggested readings, if any. Tell the reader why each book is relevant or what prerequisite information it contains.
- Conventions—What symbols do you use in the document? Use this section to define commonly used symbols, then make sure to use the symbols consistently.

B2.1.4 Revision History

A revision history tells the reader how the document differs from previous releases. This enables someone who has not used to product since it was last revised to quickly understand how the product has changed. As a rule of thumb, you should identify changes made over the last three revisions. Be brief because the reader can read the sections for more detail. If your document is new, the revision history should state that the document is new as of the publication date.

B2.1.5 Table of Contents

The table of contents contains a sequential list of the sections, major headings contained in the section, and the beginning page number of each heading. To minimize the length of the table of contents, you should only list primary and secondary level headings, as was done in this book. If your section and heading titles are explanatory, your users should be able to easily find the information they need.

B2.1.6 List of Illustrations

The list of illustrations contains a sequential list of all pictures or diagrams contained in the book and the page number on which the picture or diagram appears. This provides a quick way for your users to find a specific illustration without having to page through the book.

B2.1.7 Sections

Each section contains information about a major topic. The section title should be informative about the purpose of the section. Each section should begin with an introduction or overview of the information it contains. By reading the overview, your users can determine whether the section contains the information they need.

Present sections in the order in which they should be used by the reader. For example, the first few sections of this book provide general information that you will use as a foundation before reading the detailed sections. Good organization helps your reader more readily understand information, which is especially important when the information is unfamiliar or complex.

Within sections, present the most general information first, followed by more specific information. Each section should have a detailed heading so your users can skim the page and find specific information.

B2.1.8 Examples and Illustrations

Use examples and illustrations of products whenever possible to help your reader grasp the subject matter, retain it, and alleviate the boredom of reading a lot of text. No matter how well written, your document still covers complex and technical information and could benefit by the use of well-placed examples or illustrations.

Examples are usually textual representations of concepts presented in the text. There are many examples in this book. Each example is preceded with a lead in of some sort, such as "For example:" or "Samples include:." The example itself is presented in italics to set it off from the rest of the page.

Figures are normally illustrations that communicate information faster and better than words. Good illustrations make a book more appealing to read, easier to understand, and can reduce the number of words needed to describe a subject. Imagine how difficult it would be to textually describe a complex wiring specification for a control panel when a good illustration could convey the information clearly and simply.

Your illustrations might be developed by a graphic artist, others having product design knowledge, or even yourself. Your illustrations might be developed electronically, using a graphics software package, or they might be drafted by hand. If appropriate, your illustrations could be photographs. Whatever type of illustrations you select, make sure that all product illustrations are technically complete, accurate, and clear before including them in your document.

It is a good idea to give each illustration a unique, sequential figure number. Each illustration can then be listed in a List of Illustrations or List of Figures so that a user can find each one easily.

B2.1.9 Appendices

When you define the content and audience of each section, you may find that there is additional material that is only needed occasionally. To keep from confusing your reader with infrequently needed information, it is a good

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idea to put reference material in appendices at the end of the book. Reference material is information that can be used for clarification at various times while reading the document and eliminates the need for repetition. Organize appendices by topic and keep them simple and easy to read. Information appropriate for an appendix includes detailed theoretical information, long lists, charts, and tables.

B2.1.10 Glossary

Make sure you include a glossary of definitions of special terms and abbreviations used in your document. Failure to define unique or new terms could cause the reader to misinterpret the information presented. Make sure your definitions are technically adequate, and do not define a word by using that word or a variation of it in the definition. It is sometimes helpful to list similar or related terms or use examples to clarify definitions.

Keep a running list of key words and abbreviations as you write your document. Any word defined in text should be included in the glossary. Make sure all terms defined in the glossary are used in the document.

Use terms consistently; for example, try to keep from referring to an enclosure, box, and cabinet interchangeably.

B2.1.11 Index

Include a subject-oriented index to help your users find the location of specific information in the document. Index entries should be sorted alphabetically based on the first letter of the topic and contain all page numbers on which information about that subject can be found. Try to imagine how your readers might look for information and include index entries accordingly.

B2.1.12 Reader Comment Form

Consider including a self-addressed postage-paid comment form at the back of each book so users can send you comments about the clarity, accuracy, and completeness of your document. This can help you be sure your content was suitable for your audience. Make sure the form indicates the document name and publication number.

B3.1 STYLE GUIDELINES

This section provides a checklist of basic grammar and style guidelines to consider when developing a document. This section does not list every item you should consider, but instead focuses on those that could significantly impact the clarity of your document in regard to product safety. It is assumed that you, a technical communicator, are familiar with basic good writing techniques and your company's specific style guidelines.

B3.1.1 Abbreviations

You can use abbreviations, but avoid their overuse. Too many abbreviations confuse the reader. Use abbreviations if they enhance clarity and are widely known. Make sure that all abbreviations are defined in the book.

B3.1.2 Acronyms

An acronym is a word formed from the initial letter or letters of each of the successive or major parts of a compound term. For example, NEMA is the acronym for the National Electrical Manufacturers Association. When an acronym is first used in text, write out the term and follow the written term with the acronym in parentheses. Acronyms should always be capitalized. Too many acronyms confuse the reader, so try to limit their use.

B3.1.3 Active voice

Use active voice in your document whenever possible. Active voice refers to the way in which the subject of a sentence relates to the action expressed by the verb. An example of a sentence written in active voice is:

> *"Contact the manufacturer of the initiating device for more information."*

Contrasted with the following sentence written in passive voice:

> *"The manufacturer of the initiating device should be contacted for more information."*

Active voice generally makes your document more direct and user friendly and shortens the length of your sentences.

B3.1.4 Agreement

Make sure a pronoun agrees with its antecedent (preceding noun). For example, it is correct to say:

> *"The manufacturer warns its users of product limitations."*

because the pronoun (its) agrees with the antecedent (manufacturer). It is incorrect to say:

> *"The manufacturer warns their users of product limitations."*

because the antecedent (manufacturer) is singular and the pronoun (their) is plural.

B3.1.5 Color

Using color in your document can greatly enhance reader comprehension. If your printing budget permits it, consider using at least one color in addition to black to provide emphasis and enhance reader interest. If you are using color in your document, be careful to use it consistently; if you do not, you run the risk of confusing, rather than helping, your reader.

B3.1.6 Emphasis

Use boldface or italicized type to place emphasis on something. Use highlighting consistently, but limit its use or the impact will be reduced.

Be cautious about the use of capital letters. While sentences with bold capital letters have the appearance of emphasis, they are actually harder to read accurately and may be misread.

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B3.1.7 Jargon

Avoid the use of jargon because the reader might not be familiar with the term, which could result in the incorrect usage of a product.

B3.1.8 Lists

There are two types of lists you will use frequently: ordered and unordered.

An ordered list is one in which you would like the reader to follow the steps in the order in which they appear. This is especially important when writing installation or other instructions which could negatively impact product safety if not completed in a specific sequence. The steps in an ordered list should be numbered consecutively. For example:

Complete the following steps to silence the alarm:

a. Ensure there is no hazard.
b. Unlock and open the cabinet door.
c. Operate the ALARM SILENCE switch.

An unordered list contains items for which there is no specific sequence. Numbers should not precede items in an unordered list. However, you could use other symbols to offset items in a list, for example:

You need the following tools to install a fire alarm bell:

- Drill
- Screwdriver
- Tape measure

B3.1.9 Paragraph Structure

Each paragraph should begin with a declarative sentence that states the purpose of the paragraph. Each paragraph should be made up of a collection of sentences that all pertain to the purpose of the paragraph. A new paragraph should indicate the beginning of a new topic. Paragraphs should be presented in a logical manner ensuring that the reader makes a smooth transition from one paragraph to the next. Try to limit the length of paragraphs so the reader is not intimidated by the paragraph or does not lose his or her place.

B3.1.10 Sentence Structure

The following rules apply to sentence structure:

- Use short, simple words that are easily understandable.
- Strive for absolute clarity in every sentence. An ambiguous sentence could lead to the misuse of a product and, ultimately, to injury or death.
- Avoid unnecessary words as they might confuse the reader or change the meaning of the sentence. Keep sentences as short as possible.
- Keep related words together. The position of the words in a sentence affects the meaning of a sentence. If words are placed incorrectly, it can cause confusion. For example, the sentence:

  "Check the indicator to the right of the panel."

  makes it obvious that the reader should check the indicator located to the right of the panel. However, the sentence:

  "Check the indicator of the panel to the right."

  makes it appear that the indicator is part of the panel on the right.

B3.1.11 Spelling

Ensure that all words are spelled correctly as a misspelling could confuse the reader, change the meaning of a sentence, or make the sentence incorrect. Your company might have preferred spellings for some terms. If so, make sure to use them.

B3.1.12 Word Usage

Ensure that the words you use express the intended thought as clearly as possible. The difference between the meanings of certain words might seem subtle but could have a major impact on the meaning of a sentence. Following are some groups of words that are especially important when writing product documentation:

Can and May

Can—Implies that the ability to do something exists

Cannot—Implies that the ability to do something does not exist

May—Implies that permission is being given to do something, or that the possibility of doing something exists

Must, Shall, and Should

Must—Implies that something is mandatory

Shall—Implies an obligation to do something or that something is mandatory

Should—Implies that something is advisable, but not necessarily mandatory

Caution, Danger, and Warning

Caution—Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. (Color: yellow)

Warning—Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. (Color: orange)

Danger—Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

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Glossary

alarm initiating device. A device which, when actuated, initiates an alarm. Such devices, depending on their type, can be operated manually or actuated automatically in response to smoke, flame, heat, or waterflow.

alarm notification device. An appliance that produces an audible or visible alarm signal, or both, in response to a fire emergency.

alarm signal. A signal indicating an emergency requiring immediate action, such as an alarm for fire from a manual station, a waterflow alarm, or an alarm from an automatic fire alarm system. (also called alarm indicating appliance)

alarm system. A combination of compatible initiating devices, control panels, and indicating appliances designed and installed to produce an alarm signal in the event of a fire.

audible signal. An audible signal is the sound made by one or more audible indicating appliances such as bells or horns in response to the operating of an initiating device.

auxiliary protective signaling (fire alarm) system. A connection to the municipal fire alarm system to transmit an alarm of fire to the municipal communications center. Fire alarms from an auxiliary alarm system are received at the municipal communication center on the same equipment and by the same alerting methods as alarms transmitted from municipal fire alarm boxes located on streets.

breakglass box. A breakglass box is one in which it is necessary to break a special element in order to operate the box.

central station protective signaling (fire alarm). A central office, connected to remote alarm and supervisory signaling devices, where personnel are in attendance at all times to monitor the system activity and investigate signals. The central station personnel take immediate and appropriate action upon receipt of an alarm signal.

channel. A path or circuit for the electrical transmission of signals (or data) between two or more stations or channel terminations. Channel transmission can be via wires, coax cable, radio waves, or equivalent means of signal transmission.

control unit. A device with the control circuits necessary to (1) furnish power to a fire alarm system; (2) receive signals from alarm initiating devices and transmit them to audible alarm indicating appliances and accessory equipment; and (3) electrically supervise the system installation wiring and primary power. The control unit can be contained in one or more cabinets in adjacent or remote locations.

detector — smoke, ionization type. A detector employing the principle of smoke's effect on an electrical current flowing in an ionized air chamber.

detector — smoke, photoelectric type. A detector employing the photoelectric principle of reflection or obscuration of light by smoke.

door release, magnetic. An electromagnetic device used to hold doors open when energized. It is used on automatic closing doors to permit a means of closing such doors in case of fire.

end of line device. A device used to terminate a supervised circuit.

flame detector. A device which responds to the appearance of radiant energy present in flame.

general alarm. A term usually applied to the simultaneous operation of all the audible alarm signals on a system to indicate the need for evacuation of a building.

ground fault detector. Detects the presence of a ground condition on system wiring.

horns. An audible signal appliance in which energy produces a sound by imparting motion to a flexible component that vibrates at some nominal frequency.

labeled. Equipment or materials to which have been attached a label, symbol, or other identifying mark of an organization acceptable to the 'authority having jurisdiction' and concerned with product evaluation, that maintains periodic inspection of the production of such labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner. (See also NRTL)

listed. Equipment or materials included in a list published by an organization acceptable to the 'authority having jurisdiction' and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner. (See also NRTL)

NEC *National Electrical Code*, also published as NFPA standard 70.

NRTL Nationally Recognized Testing Laboratory. An organization approved by OSHA to test and certify equipment. UL is one NRTL that tests fire alarm equipment.

master box. A fire alarm box that can be operated by remote means to transmit a coded signal to a municipal fire alarm system.

multiplexing. A signaling method using wire path, cable carrier, radio, or a combination of these techniques, and

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characterized by the simultaneous or sequential, or both, transmission and reception of multiple signals in a communication channel including means for positively identifying each such signal.

trouble signal. An audible signal indicating trouble of any nature, such as a circuit break or ground, occurring in the device or wiring associated with a fire alarm system.

visible signal. A visible signal is the response to the operation of an initiating device by one or more direct or indirect visible notification appliances. For a direct visible signal, the sole means of notification is by direct viewing of the light source. For an indirect visible signal, the sole means of notification is by reflected light within the room.

voice paging protective signaling. A manual or automatic supervised paging system used to transmit voice messages (information, instructions, directions) on a selective and all-call basis.

waterflow switch. An assembly approved for service and so constructed and installed that any flow of water from a sprinkler system, equal to or greater than that from a single automatic sprinkler head, will result in activation of this switch and subsequent indication of an alarm condition.

zone. A designated area of a building. Commonly, zones within a building are annunciated to rapidly locate a fire.

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NEMA STANDARDIZATION

The purpose of NEMA Standards, their classification and status are set forth in certain clauses of the NEMA *Standardization Policies and Procedures* manual and are referenced below:

Purpose of Standards

National Electrical Manufacturers Association Standards are adopted in the public interest and are designed to eliminate misunderstandings between the manufacturer and the purchaser and to assist the purchaser in selecting and obtaining the proper product for their particular needs. Existence of a National Electrical Manufacturers Association Standard does not in any respect preclude any member or nonmember from manufacturing or selling products not conforming to the standard.

(Standardization Policies and Procedures, p. 1)

Definition of a Standard

A standard of the National Electrical Manufacturers Association defines a product, process or procedure with reference to one or more of the following: nomenclature, composition, construction, dimensions, tolerances, safety, operating characteristics, performance, rating, testing, and the service for which they are designed.

(Standardization Policies and Procedures, p. 2)

Dimensions

Where dimensions are given for interchangeability purposes, alternate dimensions satisfying the other provisions of the Standards Publication may be capable of otherwise equivalent performance.

(Standardization Policies and Procedures, p. 8)

Categories of Standards

National Electrical Manufacturers Association Standards are of three classes:

1. NEMA Standard, which relates to a product, process or procedure commercially standardized and subject to repetitive manufacture, which standard has been approved by at least 90 percent of the members of the Subdivision eligible to vote thereon;
2. Suggested Standard for Future Design, which may not have been regularly applied to a commercial product, but which suggests a sound engineering approach to future development, which standard has been approved by at least two-thirds of the members of the Subdivision eligible to vote thereon.
3. Adoptive Standard, which is adopted in whole or in part from the standards of another organization, either domestic, regional, or international.

(Standardization Policies and Procedures, pp 7 & 16)

Authorized Engineering Information

Authorized Engineering Information consists of explanatory data and other engineering information of an informative character not falling within the classification of NEMA Standard or Suggested Standard for Future Design, which standard has been approved by at least two-thirds of the members of the Subdivision eligible to vote on the standard.

(Standardization Policies and Procedures, pp. 7 & 16)

Official Standards Proposal

An Official Standards Proposal is an official draft of a proposed standard which is formally recommended to an outside organization(s) for consideration, comment and/or approval, and which has been approved by at least 90 percent of the members of the Subdivision eligible to vote thereon. *(Standardization Policies and Procedures, pp 7 & 16)*

Identification of Status

Standards in NEMA Standards Publications are identified in the foreword or following each standard as "NEMA Standard" or "Suggested Standard for Future Design." These indicate the status of the standard. These words are followed by a date which indicates when the standard was adopted in its present form by the Association.

The material identified as "Authorized Engineering Information" and "Official Standards Proposal" is designated similarly.

July 17, 1990

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SIGNALING, PROTECTION AND COMMUNICATIONS SECTION OF THE NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION

MEMBER COMPANIES

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Aliso Viejo, CA 92656

BRK Electronics, Inc.
Aurora, IL 60504

Cerberus Pyrotronics
Div. of Cerberus Technologies, Inc.
Cedar Knolls, NJ 07927

Cornell Electronic Products, Inc.
Milwaukee, WI 53223

Detection Systems, Inc.
Fairport, NY 14450

Dukane Corporation
St. Charles, IL 60174

Edwards
A Unit of General Signal
Norwalk, CT 06851

Executone Information Systems, Inc.
Darien, CT 06820

Faraday, Inc.
Tecumseh, MI 49286

Federal Signal Corporation
Sharpsburg, GA 30277

Fire Control Instruments, Inc.
Newton, MA 02166

Fire-Lite Alarms/Notifier
Northford, CT 06472-1001

Fisher Berkeley Corporation
Oakland, CA 94623

Gentex Corporation
Zeeland, MI 49464

Hill-Rom Company, Inc.
Batesville, IN 47006

Hochiki America
Huntington Beach, CA 92649

Honeywell Inc.
Minneapolis, MN 55408

I.E.I (North America), Inc.
Hingham, MA 02043

Jeron Electronic Systems, Inc.
Chicago, IL 60660

Johnson Controls, Inc.
Milwaukee, WI 53201

Kidde-Fenwal, Inc.
Ashland, MA 01721

Landis & Gyr Powers, Inc.
Buffalo Grove, IL 60089

Medical Communications Systems, Inc.
Lansing, IL 60438

PDI Communications
Springboro, OH 45066

Potter Electric Signal Company
St. Louis, MO 63146

Rauland-Borg Corporation
Skokie, IL 60076-2951

Sentrol, Inc.
Portland, OR 97223

Simplex Time Recorder Company
Gardner, MA 01441

System Sensor
A Division of Pittway Corporation
St. Charles, IL 60174

Tektone Sound & Signal Mfg., Inc.
Lake Park, FL 33403

Thorn Automated Systems, Inc.
Westlake, OH 44145

Wheelock Inc.
Long Branch, NJ 07740

WSA Annunciators
Falls Church, VA 22046

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