



UL 827

STANDARD FOR SAFETY

Central-Station Alarm Services

**UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL**



Documents
Document Sharing Hub

UL Standard for Safety for Central-Station Alarm Services, UL 827

Eighth Edition, Dated October 29, 2014

Summary of Topics

This Eighth Edition of ANSI/UL 827, the Standard for Central-Station Alarm Services, incorporates several substantive changes and editorial changes, including a re-organization of the requirements.

These requirements are substantially in accordance with Proposal(s) on this subject dated January 10, 2014 and May 30, 2014.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form by any means, electronic, mechanical photocopying, recording, or otherwise without prior permission of UL.

UL provides this Standard "as is" without warranty of any kind, either expressed or implied, including but not limited to, the implied warranties of merchantability or fitness for any purpose.

In no event will UL be liable for any special, incidental, consequential, indirect or similar damages, including loss of profits, lost savings, loss of data, or any other damages arising out of the use of or the inability to use this Standard, even if UL or an authorized UL representative has been advised of the possibility of such damage. In no event shall UL's liability for any damage ever exceed the price paid for this Standard, regardless of the form of the claim.

Users of the electronic versions of UL's Standards for Safety agree to defend, indemnify, and hold UL harmless from and against any loss, expense, liability, damage, claim, or judgment (including reasonable attorney's fees) resulting from any error or deviation introduced while purchaser is storing an electronic Standard on the purchaser's computer system.

The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the note following the affected item. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

The following table lists the future effective dates with the corresponding reference.

Future Effective Date	Reference
October 31, 2016	Paragraphs 11.5.4, 11.13.10, 11.14.2, 12.1.6, 12.1.7, 12.5.3, 12.5.4, 12.5.5, 12.6.1, 12.6.2, 12.6.3, 12.6.4, 12.6.5, 13.6, 13.12, 17.3.4, 17.4.1, 17.4.2, 17.4.3, 17.6.4.1, 17.6.4.2, 17.6.4.3, 17.6.4.4, 17.6.4.5, 17.6.4.6, 17.8.1, 17.8.2, 17.8.3, 17.8.4, and 17.9.1.



OCTOBER 29, 2014

1



ANSI/UL 827-2014

UL 827

Standard for Central-Station Alarm Services

First Edition – September, 1971

Second Edition – October, 1972

Third Edition – October, 1977

Fourth Edition – January, 1982

Fifth Edition – August, 1993

Sixth Edition – October, 1996

Seventh Edition – June, 2008

Eighth Edition

October 29, 2014

This ANSI/UL Standard for Safety consists of the Eighth Edition.

The most recent designation of ANSI/UL 827 as an American National Standard (ANSI) occurred on October 27, 2014. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, or effective date information.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at <http://csds.ul.com>.

UL's Standards for Safety are copyrighted by UL. Neither a printed nor electronic copy of a Standard should be altered in any way. All of UL's Standards and all copyrights, ownerships, and rights regarding those Standards shall remain the sole and exclusive property of UL.

COPYRIGHT © 2014 UNDERWRITERS LABORATORIES INC.

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents

Document Sharing Hub

No Text on This Page

**UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL**



Documents
Document Sharing Hub

CONTENTS

INTRODUCTION

1 Scope	7
2 Components	9
3 Units of Measurement	9
4 Undated References	9
5 Glossary	9
5.1 General	9
5.2 Definitions common to burglar- and fire-alarm systems	10
5.3 Definitions common to burglar-alarm	16
5.4 Definitions common to fire-alarm	17
5.5 Definitions common to residential monitoring stations	17

FACILITIES AND EQUIPMENT

6 Building Construction Requirements	18
7 Physical Protection	20
8 Fire Protection	22
8.1 Portable fire extinguishers	22
8.2 Fire suppression system	24
8.3 Water sheds	24
8.4 Repeater station fire protection	24
8.5 Automatic fire-alarm system	24
9 Standby Lighting	25
10 Clocks	25
11 Power Supply	26
11.1 General	26
11.2 Installation	27
11.3 Source	27
11.4 Primary power supply	27
11.5 Secondary power supply	27
11.6 Continuity of power supply	28
11.7 Storage batteries	29
11.8 Overcurrent protection for external batteries	29
11.9 Charging method	30
11.10 Trickle- or float-charged batteries	30
11.11 Battery chargers and DC power supplies	31
11.12 Stationary, engine-driven generators	31
11.13 Security	32
11.14 Uninterruptible power supply (UPS) units	34
11.15 Uninterruptible battery supply (UBS) units	35
11.16 Electrical transient protection	36
12 Communication Infrastructure	36
12.1 General	36
12.2 Underground entrance	37
12.3 Overhead entrance	38
12.4 Conductors inside the building	38
12.5 Antenna cable	39
12.6 Communication equipment	41
12.7 Disruption of communications	41

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents
Document Sharing Hub

13	Subsidiary Stations	42
14	Remote Signal Management Center	44
15	Equipment	46
16	Receiver Units	47
16.1	Direct-wire burglar-alarm systems	47
16.2	Code (McCulloh) transmitter systems	47
16.3	Multiplex systems	49
16.4	Digital alarm radio system (DARS)	50
16.5	One way radio alarm system (OWRAS)	51
16.6	Two-way radio alarm system (TWRAS)	53
16.7	Digital alarm communicator system units	53
16.8	Other transmission technologies	55
17	Alarm Monitoring Automation Systems	55
17.1	General	55
17.2	Automation installation software	56
17.3	Automation system equipment	56
17.4	Monitoring automation system performance	57
17.5	Monitoring equivalent weight (MEW) calculation	57
17.6	Minimum MEW factor requirements	59
17.7	Numbers of computer systems required	64
17.8	Redundant site options	64
17.9	Site specific data sheets	65
17.10	Back-up data storage system	66
17.11	Spare parts	66
17.12	Connections to the computer system	67
17.13	Printer-less environment	70
17.14	Performance	71

FIRE-ALARM SERVICES

18	Type of Service	72
19	Central-Station Operation	72
20	Personnel (Operators and Runners)	73
21	Runner's Equipment	74
22	Communications with Runners	74
23	Retransmission	74
24	Records	75
25	Maintenance and Service	76
25.1	Contracts and agreements	76
25.2	Alarm, supervisory, and trouble signals	77
25.3	Signals from systems other than central-station fire-alarm systems	77
25.4	Disruption of communications	78
26	Testing and Inspection	78
27	Protected Premises Control and Transmitter Units	78

BURGLAR-ALARM SERVICES

28	Central-Station Operation	78
29	Personnel (Operators and Runners)	79
30	Runner's Equipment	80
31	Communication with Runners	80
32	Retransmission	80
33	Burglar-Alarm Protected Premises Control Units	81

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM  Documents
Document Sharing Hub

33.1	General	81
33.2	Direct-wire, burglar-alarm subscriber control units	81
33.3	Code (McCulloh) transmitter burglar-alarm systems subscriber control units	81
33.4	Multiplex burglar-alarm systems subscriber control unit	81
33.5	Digital alarm communicator transmitter (DACT) subscriber control unit	81
33.6	Radio (RF) systems subscriber's control unit	82
34	Burglar-Alarm Protection Service	82
34.1	Alarm response time	82
34.2	Signal transmission methods for burglar-alarm systems	83
34.3	Line security	85
35	Openings and Closing	85
35.1	General	85
35.2	Openings and closing without a schedule	86
35.3	Openings and closing with a schedule	86
35.4	Unscheduled opening	87
35.5	Control unit programming	87
36	Closing and Malfunctions During Closing	88
37	Alarms and Unauthorized Openings	88
37.1	Alarm investigation	88
37.2	Alarm verification	90
37.3	Investigation of a compromise attempt	92
37.4	Investigation of a missing check-in signal	92
37.5	Alarm response overruns	93
37.6	Unwanted alarms	93
37.7	Signals from systems other than central-station burglar-alarm systems	94
37.8	Disruption of communication	94
38	Identification of Subscribers	94
39	Handling of Subscriber's Keys	95
39.1	General	95
39.2	Key vaults	95
40	Records	95
41	Maintenance and Service	97
41.1	Contracts and agreements	97
41.2	Repairs	97
42	Power Failure	98

RESIDENTIAL MONITORING STATION

43	Residential Monitoring Station Operation	98
44	Personnel (Operators)	99
45	Signal Processing	99
46	Retransmission	100
47	Disruption of Communication	100
48	Records	100

TEMPORARY OPERATING CENTERS

49	Temporary Operating Centers	101
----	-----------------------------	-----

COMMUNICATION DISRUPTIONS

50	Reaction to Communications Disruptions	102
50.1	Disruption of Communication with Public Safety Organizations	102

50.2 Disruption of a communication channel	103
--	-----

APPENDIX A

Standards for Components.....	A1
-------------------------------	----

APPENDIX B – INFORMATIVE

INTRODUCTION



INTRODUCTION

1 Scope

1.1 These requirements apply to:

- a) Central stations providing watchman, fire-alarm, and supervisory services as described in the National Fire Alarm and Signaling Code, NFPA 72;
- b) Central-station burglar-alarm systems intended and specifically designated for burglary protection use at mercantile and banking premises, on mercantile safes and vaults, and on bank safes and vaults;
- c) Residential monitoring stations monitoring residential alarm systems;
- d) Redundant sites; and
- e) Remote signal management centers.

1.2 These requirements apply to monitoring stations that are intended to be located in buildings constructed in accordance with building codes, such as the Building Officials and Code Administrators (BOCA) National Building Code, the International Building Code, the Standard Building Code, and the Uniform Building Code.

1.3 The central-station burglar- and fire-alarm or residential alarm systems covered by these requirements are systems in which the operation of electrical protection circuits and devices are signaled automatically to, recorded in, and supervised from a central-station or residential monitoring station having trained operators on duty at all times.

1.4 Requirements covering the construction and operation of burglar-alarm units used in the burglar-alarm systems covered by this Standard are contained in the Standard for Central-Station Burglar-Alarm Units, UL 1610, and the Standard for Digital Alarm Communicator System Units, UL 1635.

1.5 Burglar-alarm protective devices installed on individual properties are classified as to the extent of protection at each location. Requirements covering installation and classification (of extent) of alarm protective equipment at individual locations are contained in the Standard for Installation and Classification of Burglar and Holdup Alarm Systems, UL 681.

1.6 Burglar-alarm protective devices installed in residential alarm systems at individual properties are classified as to the extent of protection at each location. Requirements covering installation and classification (of extent) of alarm protective equipment at individual locations are contained in the Standard for Installation and Classification of Residential Burglar Alarm Systems, UL 1641.

1.7 Requirements covering the construction and operation of fire-protective signaling equipment used in the systems covered by this standard are contained in the Standard for Control Units and Accessories for Fire Alarm Systems, UL 864.

1.8 Requirements for the installation of fire-alarm initiating devices and notification appliances installed at individual properties are contained in the National Fire Alarm and Signaling Code, NFPA 72.

1.9 Systems covered by these requirements operate within the limits of the National Electrical Code, NFPA 70, as applied by the local authority having jurisdiction. The Articles of the National Electrical Code that apply are:

- a) Article 725, within the limits of Class 2 or Class 3 remote-control and signaling circuits for burglar-alarm systems;
- b) Article 760 for fire-alarm systems;
- c) Article 800 for outside wiring and protectors;
- d) Article 820 for protectors for radio antennas; and
- e) Article 830 for Network-Powered Broadband Communications Systems.

1.10 Requirements for software and hardware, and the installation and operation of an automation system in a central station, remote signal management center, redundant site, subsidiary station or residential monitoring station are covered by the Standard for Central-Station Automation Systems, UL 1981, or by the Standard for Control Units and Accessories for Fire Alarm Systems, UL 864, and/or the Standard for Central-Station Burglar-Alarm Units, UL 1610.

1.11 A reference made to "station" refers to a central station (burglary or fire), remote signal management center, subsidiary station, or residential monitoring station, depending upon the context in which it is used

1.12 These requirements do not cover the communication channel between the protected property and the station unless the communication company is owned and operated by the station. This includes:

- a) The company that provides the communication channel; and
- b) The equipment that is used to provide the communication channel.

1.13 The units, devices, and systems covered by the above standards shall operate, and be applied as defined therein, unless this Standard, UL 827, indicates otherwise.

**UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL**



Documents
Document Sharing Hub

2 Components

2.1 Except as indicated in 2.2, a component used in a station or a burglar-alarm or fire-alarm installation covered by this Standard shall comply with the requirements for that component. See Appendix A for a list of standards covering components generally used to provide the services covered by this Standard.

2.2 A component is not required to comply with a specific requirement that:

- a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or
- b) Is superseded by a requirement in this standard.

2.3 A component shall be used in accordance with its rating established for the intended conditions of use.

2.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

3 Units of Measurement

3.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

4 Undated References

4.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

5 Glossary

5.1 General

5.1.1 For the purpose of this Standard, the following definitions apply.

5.2 Definitions common to burglar- and fire-alarm systems

5.2.1 ACTIVE SYSTEM – A system that transmits one or both of the following signals to the central-station on a regular basis:

- a) A signal that the system has been disarmed and the protection removed (commonly referred to as "opened"); or
- b) A signal that the system has been armed and the protection activated (commonly referred to as "closed").

If an alarm system sends opening and closing (disarm and arm) signals, it is considered to be an active system. Supervisory check-in signals transmitted from a system does not make it an active system. (See 5.2.28 Inactive System).

5.2.2 AUTOMATIC FIRE-ALARM SYSTEM – A fire detection system that will automatically detect and annunciate the presence of fire by the detection of one or more products of combustion. Annunciation is through a fire-alarm system control unit.

5.2.3 AUTOMATION SYSTEM – A computer system that consists of hardware and software components. These components include the alarm-monitoring software supplied by the automation system developer, the operating system, and programming languages, required to make the system operational. An automation system may be configured as a computer system that is directly connected to hardware based central-station receivers, internal software based receivers, or is connected to remote receivers located in central-stations other than the one where the automation system is located. It is used to automatically process change-of-status signals such as alarm, trouble, supervisory, disarming and arming (i.e. opening and closing), and similar signals that it receives from the central station receiving equipment. See the Standard for Central-Station Automation Systems, UL 1981.

5.2.4 BACKUP CENTER – A location that is capable of being staffed in order to process signals in the event the Central Station becomes uninhabitable or inoperable. This center is another location that the operator of the Central Station has chosen to maintain for backup purposes.

5.2.5 BUILDING, MULTIPLE OCCUPANCY – A building that is occupied by two or more independent tenants who do not have control of each other.

5.2.6 BUILDING, SINGLE OCCUPANCY – A building that is occupied by and under the control of the alarm service company only. Any business in the building that is not directly associated with the alarm service shall be the business of, and controlled by, the alarm service company.

5.2.7 CENTRAL-STATION – A building, distributed group of buildings, or a distributed group of enclosed areas within a building that is occupied by the alarm service company that operates the central station, other businesses that are owned, and controlled by the alarm service company and which houses an operating room and equipment used to provide central-station service to protected properties.

5.2.8 CENTRAL-STATION SERVICE – The use of a system or a group of systems in which the operation of circuits and devices at a protected property are signaled to, recorded in, and supervised from a central station having trained operators who, upon the receipt of a signal, take such action as required by the nature of the signal received.

5.2.9 COMPUTER CLUSTER – High-available clusters or Failover clusters. A group of two or more computers that are connected to form redundant nodes which are used to provide service when system components fail. Such high-availability or failover clusters are designed to use redundancy of cluster components to eliminate single points of failure.

5.2.10 CODE TRANSMITTER SYSTEM – A system that provides for the connection of more than one protection system to a single alarm receiving unit at the station.

5.2.11 DERIVED CHANNEL – A signaling line circuit that uses the local leg of the public telephone company's switched network as an active multiplex channel, while simultaneously allowing the leg's use for normal telephone communications.

5.2.12 DIGITAL ALARM COMMUNICATOR RECEIVER (DACR) – A system component located at the central station that will receive and display signals from a DACT (see 5.2.14).

5.2.13 DIGITAL ALARM COMMUNICATOR SYSTEM – A system that provides for the connection of a protection system to a station through the telephone company's switched network or a wireless communication device utilizing standard industry equipment and licensed for commercial use system.

5.2.14 DIGITAL ALARM COMMUNICATOR TRANSMITTER (DACT) – A system component located at the protected premises that will contact a DACR (see 5.2.12) through the public switched telephone network, when there is a change or status in the alarm system, and transmit the necessary data to identify the protected premises and the change of status. The connection to the public switched telephone network may use a wired or wireless path. A DACT is either integral with the control unit that provides alarm or monitoring functions, or interfaces with a control unit that provides these functions.

5.2.15 DIGITAL ALARM RADIO RECEIVER (DARR) – A system component used in a DARS (see 5.2.16) to receive radio signals transmitted from a DART (see 5.2.17).

5.2.16 DIGITAL ALARM RADIO SYSTEM (DARS) – A one-way radio system that provides backup transmission for a DACT (see 5.2.14).

5.2.17 DIGITAL ALARM RADIO TRANSMITTER (DART) – A system component used in a DARS (see 5.2.16) to transmit signals to a DARR (see 5.2.15) via radio signals.

5.2.18 DIRECT-WIRE SYSTEM – A system that provides for the connection of a single protection system to a single alarm-receiving unit at the station.

5.2.19 EMERGENCY COMMUNICATION SYSTEM (ECS) – A system used to communicate with the public that an emergency exists and provide instructions for them (the public) to follow for their safety. There are also systems used to deal with mass-communications that do not qualify as a "life-safety" system. As used within the context of this Standard the ECS systems are the type used in "life-safety" applications.

5.2.20 ENCRYPTION – The process of transforming information using an algorithm to make it unreadable to anyone except those possessing special knowledge, usually referred to as a key.

5.2.21 ENCRYPTION, ADVANCED – Encryption software that utilizes an algorithm which has been certified as compliant with the National Institute of Standards and Technologies (NIST) cryptographic algorithm validation program is used by each computer connected to a network.

5.2.22 ENCRYPTION, BASIC – Encryption software that is provided as part of the operating system used by each computer connected to a network.

5.2.23 FAULT-TOLERANT COMPUTER SYSTEM – A computer system containing multiple power supplies, disks, processors, and controllers, each of which backing-up and checking on the processes of the others. In the event of a component failure, the other modules take over the job performed by the failed component without affecting the operation of the computer. In addition to the duplicate hardware, a fault-tolerant system includes software components consisting of the operating system, programming languages, and the alarm-monitoring software supplied by the automation system software developer required to make the system operational. See 5.2.45 for the definitions of redundant computer system. A fault-tolerant computer system as defined above is considered to be a redundant system.

5.2.24 HIGH AVAILABILITY COMPUTER SYSTEM – A computer system that has been designed and implemented to ensure the system will be operational 99.9% of every 12 month period. This performance shall include both operational time and any downtime for scheduled maintenance that may occur in the 12 month period.

5.2.25 HUNT GROUP – A group of associated telephone lines within which an incoming call is automatically routed to an idle (not busy) telephone line for completion.

5.2.26 HVAC SYSTEM – A heating, ventilation, and air conditioning system.

5.2.27 IDENTIFICATION CODE – The numeric, alpha numeric, alpha, word(s), or similar device used to identify a subscriber.

5.2.28 INACTIVE SYSTEM – A system that transmits a signal to the central-station only when an unintended condition exists or it is under test. Examples of inactive systems are fire- and holdup alarms, or a burglar alarm system supervising a protected premise without the use of opening and closing signals. Check-in signals transmitted from a system does not make it an active system.

5.2.29 KEY VAULT – An attack resistant container mounted outside of the protected premises that contains the key(s) that will allow entrance into the protected premises. The key vault can be opened with a mechanical key or a card key that is common to several key vaults and which is carried by the runner. Other emergency services, such as the fire department, law enforcement department and authorized private guard service may also have access to the key vault.

5.2.30 MONITORING EQUIVALENT WEIGHT (MEW) FACTOR – A calculation used to determine the minimum system configuration and hardware for an automation system that is used in conjunction with the delivery of central station services.

5.2.31 MULTIPLEXING – A method of signaling characterized by the simultaneous or sequential transmission and reception of multiple signals over a communication channel and the provision of means for positively identifying each signal. The signaling may be accomplished over a communication channel or radio carrier or a combination of both.

5.2.32 ONE-WAY RADIO ALARM SYSTEM (OWRAS) – A system in which alarm system signals are transmitted from a RAT (see 5.2.42) through a radio channel to at least two independently powered, independently operating, and separately located RARSRs (see 5.2.40) and which are then relayed to a RASSR (see 5.2.41). Signals may be transmitted through one RARSR provided they are also transmitted directly to the RASSR.

5.2.33 OPERATING ROOM – The physically enclosed area within a station that is secured against unauthorized access and where the operators receive and act on the signals that are transmitted to the station.

5.2.34 OPERATOR – A trained employee of the station whose duty is to provide immediate response to all signals received in the operating room.

5.2.35 PACKET SWITCHED DATA NETWORK (PSDN) – A type of data transmission in which data is divided into packets, each of which has a destination address. Each packet is then routed across a computer network. A packet may travel a different route than packets related to it.

5.2.36 PERSONAL IDENTIFIER – A physical attribute of a person used as a means of verification of personnel identity, such as by retina scan, voice print, fingerprint, hand span, and the like.

5.2.37 POWER ROOM – The area(s) in which the primary and secondary power supplies are housed. This room may or may not include an engine driven generator or uninterruptible battery supply.

5.2.38 PUBLIC SWITCHED TELEPHONE NETWORK (PSTN) – An assembly of communications equipment and telephone service providers that utilize Managed Facilities-based Voice Networks (MFVN) to provide the general public with the ability to establish communications channels via discrete dialing codes. (Source NFPA 72, 2010 edition).

5.2.39 PUBLIC SAFETY ANSWERING POINT (PSAP) – A facility responsible for answering and processing calls for assistance from emergency service organizations such as fire departments, law enforcement departments, and emergency medical service organizations.

5.2.40 RADIO ALARM REPEATER STATION RECEIVER (RARSR) – A system component, used in an OWRAS (see 5.2.32) or a TWRAS (see 5.2.62), consisting of a radio receiver and transmitter located at a repeater station or subsidiary station. This component receives radio signals from a RAT (see 5.2.42) and retransmits them to another RARSR or to a RASSR (see 5.2.41) in a OWRAS (see 5.2.32), or relays signals between a RATR (see 5.2.43) and a RASSR in a TWRAS.

5.2.41 RADIO ALARM SUPERVISING STATION RECEIVER (RASSR) – A radio receiver or receiver/transmitter located at a station, to receive signals from a RARSR (see 5.2.40), RAT (see 5.2.42), or RATR (see 5.2.43) and either annunciates them or interfaces with an automation system that annunciates them.

5.2.42 RADIO ALARM TRANSMITTER (RAT) – A radio transmitter used in an OWRAS (see 5.2.32) located at a protected premises that will transmit signals to at least two independently powered, independently operating, and separately located RARSRs (see 5.2.40). Signals may be transmitted through one RARSR if they are also transmitted directly to the RASSR. A RAT either:

- a) Is integral with a control unit that provides alarm or monitoring functions; or
- b) Interfaces with a control unit that provides these functions.

5.2.43 RADIO ALARM TRANSMITTER/RECEIVER (RATR) – A radio transmitter/receiver used in a TWRAS (see 5.2.62) that is located at a protected premises that will transmit and receive signals through at least two independently powered, independently operating, and separately located RARSRs (See 5.2.40) to and from a RASSR (See 5.2.41), or transmits and receives signals directly to and from a RASSR. A RATR either:

- a) Is integral with a control unit that provides alarm or monitoring functions; or
- b) Interfaces with a control unit that provides these functions.

5.2.44 REDUNDANT ARRAY OF INDEPENDENT DISKS (RAID) – A configuration that provides redundancy and continued performance in the event of a single disk drive failure.

5.2.45 REDUNDANT COMPUTER SYSTEM – Two or more computer systems maintained at a central-station, either of which can quickly be connected and operational for processing alarm signals in the event that the other computer fails to operate. (See 5.2.23). A fault-tolerant computer system is considered to be redundant.

5.2.46 REDUNDANT SITE – A physical location that is able to provide all of the essential functions of a central-station should an automated central-station become unable to process signals.

5.2.47 RELOCATION CENTER – A location that is acquired and configured when a central station is unable to operate.

5.2.48 REMOTE SIGNAL MANAGEMENT CENTER – A location operated by the central station in which equipment associated with an alarm monitoring automation system, such as operator workstations or tertiary automation system equipment and the like, is housed.

5.2.49 REPEATER STATION – Equipment, such as radio, which is used to relay signals from protected systems installed at other location(s).

5.2.50 RUNNER – A person whose duties are to investigate signals from protected systems that require investigation.

5.2.51 RUNNER OR SERVICEPERSON STATION – A location separate from the central-station, subsidiary station, remote signal management center, or service center, where runners or servicepersons are stationed awaiting instructions to respond to signals received at the central-station. Signals are not to be received at a runner or serviceperson station.

5.2.52 RUNNER SERVICE COMPANY – A company that is independent of the central-station which provides runners to respond to signals received by the station as required by this Standard.

5.2.53 SERVICE CENTER – A location which may be separate from a central-station that provides required installation, maintenance, repair, and alarm investigator service to systems served by the company. Keys (where required) and maintenance records for protected premises are retained at the service center. Maintenance records are not required to be physically kept at the service center if they can be readily accessed at the service center from another location.

5.2.54 SERVICE VEHICLE – A vehicle that is used to provide required alarm investigator, installation, maintenance, and repair service to systems served by the company.

5.2.55 SERVICEPERSON – A person whose duties are to provide service to protected systems.

5.2.56 SIMPLE NETWORK MANAGEMENT PROTOCOL (SNMP) – An Internet-standard protocol for managing devices on IP networks.

5.2.57 SUBSCRIBER – The user of a premise or item protected by a central-station burglar or- fire-alarm system. An authorized representative of the user may also be considered a subscriber. For residential monitoring stations, a subscriber would be an occupant of a residence protected by the alarm system.

5.2.58 SUBSIDIARY STATION – A normally unattended physically secure facility linked by communication channels to a central-station or residential monitoring station. Signals from protected properties are transmitted to the subsidiary station and then relayed to the station. If the communication link between the subsidiary station and the station is out of service, the subsidiary station can be staffed and operated as a central-station or residential monitoring station.

5.2.59 SUPERVISED BURGLAR ALARM SYSTEM – An active alarm system (See 5.2.1) in which the central-station operators initiate follow up actions when an anticipated signal , such as an opening, closing, or check-in is missed or improperly sent.

5.2.60 TEMPORARY OPERATING CENTER – A location that functions as a replacement for an uninhabitable Central Station and/or Redundant Site, when needed.

5.2.61 TERTIARY SYSTEM – An additional computer system to a Redundant Computer System, that may or may not be housed in the central station.

5.2.62 TWO-WAY RADIO ALARM SYSTEM (TWRAS) – A system in which alarm system signals are transmitted and received through a radio channel between a RATR (see 5.2.43) and a RASSR (see 5.2.41). The signals may or may not be relayed through a RARSR (see 5.2.40).

5.2.63 UNINTERRUPTIBLE BATTERY SUPPLY (UBS) – A direct current (DC) generator driven by a combustion engine. The DC output is used to provide the DC power required by an uninterruptible power supply (UPS) or by DC powered units.

5.2.64 UNINTERRUPTIBLE POWER SUPPLY (UPS) – Equipment that will continue to provide alternating current (AC) power to a load in the event of failure of the normal AC power source. A UPS may also provide a more constant voltage and frequency supply to the load. When the normal source of AC fails, the UPS is powered by a DC source from batteries, a UBS, or both.

5.2.65 VIRTUAL PRIVATE NETWORK (VPN) – A private computer network that interconnects remote (and often geographically separate) networks through primarily public communication infrastructures such as the Internet. VPNs provide security through tunneling protocols and security procedures such as encryption.

5.3 Definitions common to burglar-alarm

5.3.1 **ACKNOWLEDGMENT SIGNAL** – An audible and/or visual signal that is sent to the subscriber by the station to notify the subscriber that a signal has been received indicating that the protection system has been properly armed. The acknowledgment signal is to be sent manually or automatically.

5.3.2 **CENTRAL-STATION BURGLAR-ALARM COMPANY** – A company that is engaged in the business of operating one or more central-stations that provide monitoring, record keeping, and reporting for signals received from central-station burglar-alarm systems. The company shall directly provide for equipment installation, inspection, testing, maintenance and repair service of central-station systems, and runners for alarm investigation service, or it may subcontract for these services. In either case the company bears full responsibility the compliance of these services. The company may also operate one or more subsidiary stations or remote signal management centers.

5.3.3 **CENTRAL-STATION BURGLAR-ALARM SYSTEM** – A system or group of systems consisting of control units, intrusion detection units, contacts, protective wiring, installation wiring, and the like, installed at a protected property in accordance with the Standard for Installation and Classification of Burglar and Holdup Alarm Systems, UL 681. When the system is armed, detection of an intrusion will cause a signal to be automatically transmitted to a central-station complying with this standard. Arming the system will cause a closing signal to be transmitted and disarming the system will cause an opening signal to be transmitted. The system is to be controlled and operated by a central-station burglar-alarm company.

5.3.4 **KEY INSTALLATION** – is system for which the central-station holds the keys necessary to permit runners immediate access from the street to the interior of the protected premises or the premises enclosing a protected mercantile vault, safe, stockroom, ATM, or the like.

5.3.5 **LINE SECURITY, STANDARD AND ENCRYPTION** – Methods of supervising the communication channel used to transmit signals between the protected premises and the central-station or residential monitoring station. This supervision serves to detect compromise attempts on the communication channel that are intended to not cause signals to be annunciated at the station and which would allow entry into the protected premises without initiating a signal at the station.

5.3.6 **SUBSCRIBER'S BURGLAR-ALARM CONTROL UNIT** – Equipment located at the protected premises that controls the protective circuit(s), transmits signals to the central-station or residential monitoring station, and allows the subscriber to arm and disarm the alarm system.

5.4 Definitions common to fire-alarm

5.4.1 CENTRAL-STATION FIRE-ALARM COMPANY – A company that is engaged in the business of operating one or more central-stations that provide monitoring, retransmission of signals, and associated record keeping and reporting for signals from central-station fire-alarm systems. The station shall directly provide for equipment installation, inspection, testing, maintenance and repair service of central-station systems, runner service, and associated central-station services, or they may subcontract for these services. The company may also operate one or more subsidiary stations or remote signal management centers. The station may also monitor central-station fire-alarm systems installed and maintained by a fire-alarm service – local company. The company operating the central-station may also operate one or more subsidiary stations or remote signal management centers.

5.4.2 CENTRAL-STATION FIRE-ALARM SYSTEM – A system or group of systems installed in accordance with the requirements of the National Fire Alarm and Signaling Code, NFPA 72, in which the operation of circuits and devices are transmitted automatically to, recorded in, maintained by, and supervised from a central-station having trained operators who, upon receipt of a signal, take action as required by NFPA 72. The system is to be controlled and operated by a central-station fire-alarm company.

5.4.3 FIRE-ALARM SERVICE – LOCAL COMPANY – A company that provides protected premises equipment installation, inspection, testing, maintenance and repair service of central-station fire-alarm systems with its own facilities and personnel in accordance with the requirements of the National Fire Alarm and Signaling Code, NFPA 72. The company subcontracts the monitoring, retransmission, and associated record keeping and reporting with a central-station. The required runner service is provided by the company or by the central-station.

5.5 Definitions common to residential monitoring stations

5.5.1 RESIDENTIAL MONITORED ACCOUNT – A single or two family dwelling with an installed alarm system being monitoring by a Central Station, and which does not have supervised openings and closings.

5.5.2 RESIDENTIAL MONITORING STATION – A building or enclosed area within a building that houses an operating room and equipment used to provide residential monitoring station service to protected properties.

5.5.3 RESIDENTIAL MONITORING STATION COMPANY – A company that is engaged in the business of operating one or more residential monitoring stations that provide monitoring, record keeping, and reporting for signals from alarm systems. The company may also operate one or more subsidiary stations or remote signal management centers.

FACILITIES AND EQUIPMENT

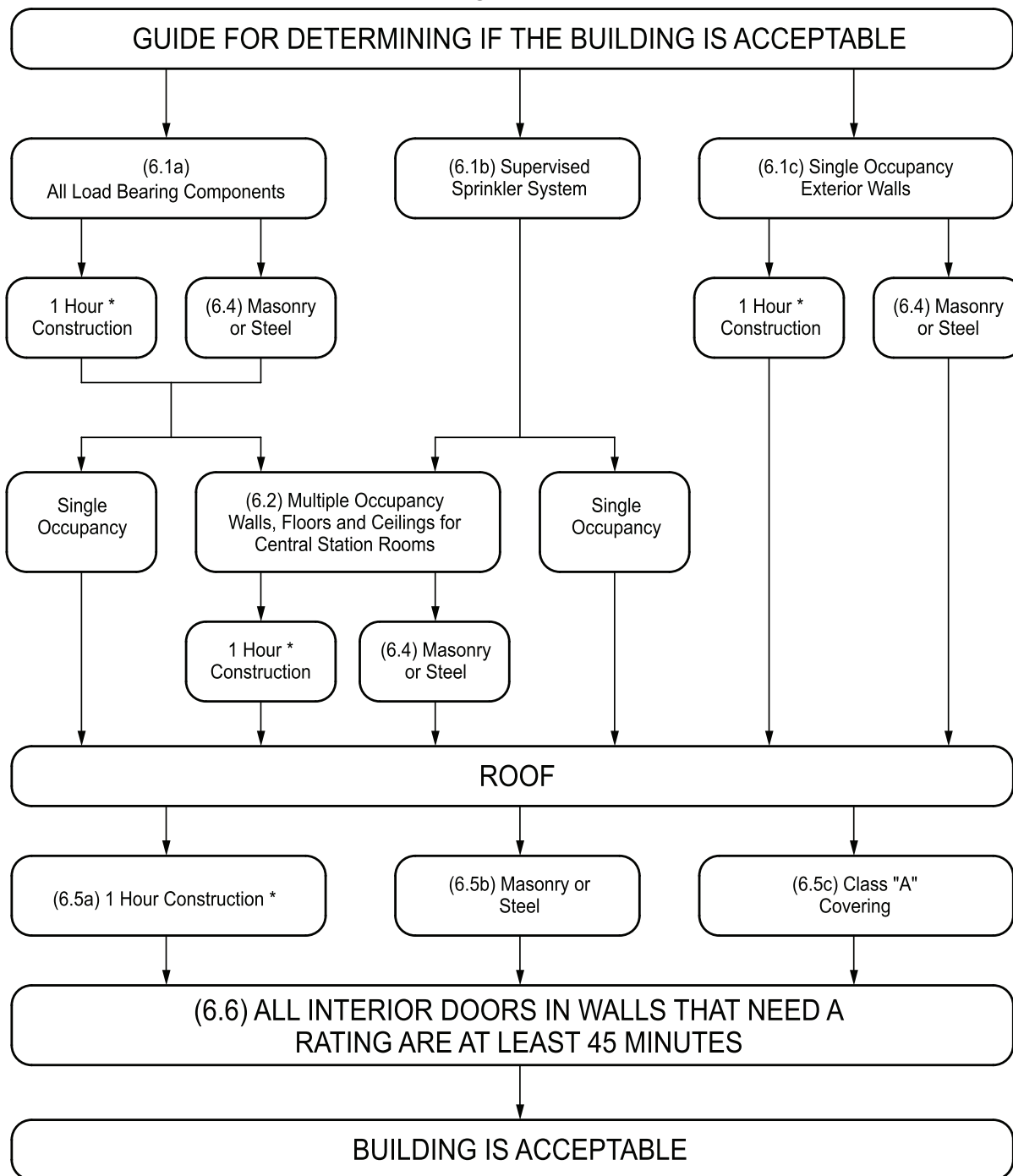
6 Building Construction Requirements

6.1 A building that houses a central station, remote signal management center, subsidiary station, or residential monitoring station shall comply with one of the following:

- a) All bearing walls, floors, ceilings, columns, beams, girders, trusses, and arches have a one-hour fire resistant rating or are constructed of the materials specified in 6.4;
- b) A sprinkler system, supervised by the station, installed in all parts of the building except for the operating room and power room; or
- c) The building is single occupancy (See 5.2.5) and the exterior walls have a one-hour fire resistant rating or are constructed of the materials specified in 6.4.

See also Figure 6.1.

Figure 6.1
Building construction



su1729

* May be determined by compliance with the local building code, or the Standard for Fire Tests of Building Construction and Materials, UL 263. See 6.3.

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents

Document Sharing Hub

6.2 In a multiple occupancy building (See 5.2.5), the walls, floors and ceilings enclosing the station (See 1.10) shall have a one hour fire resistant rating or be constructed of the materials specified in 6.4.

6.3 The fire resistant rating of building construction shall:

- a) Meet the requirements of the local building code; or
- b) Be determined by the test methods in the Standard for Fire Tests of Building Construction and Materials, UL 263.

6.4 Walls, floors, ceilings, beams, girders, trusses, and arches that are constructed of masonry or steel, or other materials deemed to have similar combustive characteristics are not required to have a fire resistant rating.

6.5 A building that houses a station shall either have a roof:

- a) With a one-hour, fire-resistant rating;
- b) Constructed of materials specified in 6.4; or
- c) Constructed of a combustible deck with a Class A roof covering complying with the Standard for Materials for Built-Up Roof Coverings, UL 55A, and the Standard Test Methods for Fire Tests of Roof Coverings, UL 790.

6.6 Any door in an interior wall that is required to have a fire resistant rating shall have a minimum 3/4-hour fire resistant rating.

6.7 If a repeater station is located in a building:

- a) The building shall comply with 6.1; or
- b) The repeater station shall be duplicated at separate sites and signals shall be able to be relayed through either site.

7 Physical Protection

7.1 The operating room of a central, subsidiary, residential monitoring station, or remote signal management center shall be completely enclosed within a boundary that is fixed-in-place and shall be protected at all times against attack or entrance by unauthorized persons. Walls enclosing an operating room shall be constructed on a fixed-in-place floor deck and comply with one of the following:

- a) Extend to a fixed-in-place ceiling or the underside of the building roof;
- b) If a suspended ceiling is used, and the wall construction above the suspended ceiling is not required to serve as a fire stop, the portion of the wall above the suspended ceiling shall be constructed of wire-mesh screening constructed of at least 0.053 inch (1.35 mm) expanded sheet steel or 10 AWG (0.102 inch diameter) (5.26 mm²) steel wire with openings not greater than 2 inches (51 mm); or
- c) The walls extend to a suspended ceiling system and the entire station is configured as follows:

- 1) Access into and throughout the station is controlled by the company operating the station; and
- 2) Enclosed by fixed-in-place walls that extend from a fixed-in-place floor to a fixed-in-place ceiling, floor-ceiling assembly, or the underside of the building roof;
- 3) A burglar alarm system that complies with an Extent Number 3 in the Standard for Installation and Classification of Burglar and Holdup Alarm Systems, UL 681, shall be installed in the areas surrounding the operating room. The burglar alarm system shall be armed when the areas are unoccupied after normal business hours and shall be monitored in the operating room.

7.2 Entrances into the operating room shall be kept locked at all times and arranged so that positive identification can be made by vision and voice of any person seeking admittance. If the person is unknown to the personnel, they shall be identified by an identification card or the like. If a closed circuit television camera is used, a second means shall be provided and consist of either;

- a) A second closed television camera with the same field of view as the first camera; or
- b) A manual means of visual identification such as a peephole or the equivalent.

7.3 A door into the operating room of a station shall be one of the following:

- a) A recognized fire-resistant door and door frame;
- b) A solid or hollow metal door;
- c) A solid wood, or solid wood core door with wood, plastic, or composition cladding a minimum of 1-1/2 inches (38 mm) thick; or
- d) Where the door is located in an area that is controlled by the station such that only authorized persons have access to it, the door may be of glazing that complies with local building codes.

7.4 The entry door shall be equipped with an automatic door closer without a hold open feature, and a locking means that cannot be changed to an unlocked condition.

7.5 If the door is locked with an electromagnetic lock or similar device that requires electrical power to maintain the locking of the door, standby power or a backup mechanical lock shall be provided to maintain the locking of the door. The standby power shall be provided from the secondary power supply (see 11.5).

7.6 The operating room shall be arranged so that a person that is outside of the operating room in an area that is controlled by the station, cannot view the signal processing equipment to obtain information about an alarm system served by the station.

7.7 Any transparent window or panel that provides a view of the operating room from a location that is not under the control of the station shall be made translucent or opaque by painting, screening, blinds, curtains, drapes, or similar coverings. Mirrored, tinted, and one-way glass shall not be used for that purpose unless they are under the control of the Central Station in such a manner as to prevent a potential inversion of the one-way viewing functionality.

7.8 Any exterior opening, other than a door, that leads into the operating room from an area that is not controlled by the station, and which is both greater than 96 square inches (619 cm²) with the smallest dimension exceeding 6 inches (152 mm) and accessible as defined in the Standard for Installation and Classification of Burglar and Holdup Alarm Systems, UL 681, shall be covered with any of the following:

- a) Permanently-installed solid bars constructed of iron or steel at least 1/2 inch (12.7 mm) diameter, or rectangular with a minimum cross-section area of 0.25 square inch (40 mm²) with the minimum dimension 1/4 inch (6.4 mm). The space between bars shall be 4 inches (102 mm) or less and the space between supporting cross pieces shall be 18 inches (457 mm) or less. The supporting cross pieces shall be of the same material and dimension as the bars or larger;
- b) Wire-mesh screening constructed of at least 0.053 inch (1.35 mm) expanded sheet steel or 10 AWG (0.102 inch diameter) (5.26 mm²) steel wire with openings not greater than 2 inches (51 mm);
- c) Glazing complying with the Standard for Burglary Resisting Glazing Material, UL 972;
- d) Glazing complying with the Standard for Bullet-Resisting Equipment, UL 752; or
- e) Filled with glass block that is bonded together with mortar.

7.9 A subsidiary station, a repeater station that is located in a building and does not comply with 6.7(b), a remote signal management center or redundant site that is not staffed at all times shall be equipped with a burglar-alarm and automatic fire-alarm system connected to the central station or residential monitoring station. The automatic fire-alarm system shall comply with the requirements in the National Fire Alarm and Signaling Code, NFPA 72. The burglar-alarm system shall comply with Extent No. 3 in the Standard for Installation and Classification of Burglar and Holdup Alarm Systems, UL 681, and shall be armed when the station is unattended. Equipment used to form the burglar-alarm and fire-alarm system shall comply with the applicable standard for such equipment (See Appendix A).

8 Fire Protection

8.1 Portable fire extinguishers

8.1.1 Each station operating room shall be equipped with a minimum of two multipurpose fire extinguishers rated 2-A:10-B:C or two portable fire extinguishers rated 2-A or greater and two portable fire extinguishers rated 10-B:C or greater.

8.1.2 Where an automation system or receivers are located in a separate room within or outside of the operating room a fire extinguisher rated 2-A:10-B:C and complies with 8.1.6 shall be located outside of the room and within 3 feet (0.9 m) of the door or in compliance with 8.2. One of the fire extinguishers required in 8.1.1 may fulfill this requirement provided it is readily accessible and immediately available for use in the operating room. Such rooms shall be provided with an automatic smoke and fire detection system that complies with the National Fire Alarm and Signaling Code, NFPA 72, and annunciates in the operating room.

8.1.3 Each power room, battery room, and engine-driven generator room or enclosure shall be equipped with a minimum of one multipurpose fire extinguisher rated at 2-A:10-B:C or one portable fire extinguisher rated 2-A or greater and one portable fire extinguisher rated 10-B:C or greater.

8.1.4 Portable fire extinguishers shall comply with the applicable Standards below:

- a) The Standard for Water Fire Extinguishers, UL 626
- b) The Standard for Carbon-Dioxide Fire Extinguishers, UL 154
- c) The Standard for Dry Chemical Fire Extinguishers, UL 299;
- d) The Standard for Halocarbon Clean Agent Fire Extinguishers, UL 2129.

8.1.5 A fire extinguisher intended to be used on electronic equipment, such as an automation system or receiver, shall be of the carbon dioxide or halogenated agent type and shall be located next to the equipment it is to protect if there are other types of extinguishers in the same room.

8.1.6 Fire extinguishers shall be located where they are readily accessible and immediately available. If they are mounted in a location that is not visible from any point in the operating room, their location shall be marked by a sign or similar notice.

8.1.7 A fire extinguisher shall be installed on the hanger or in the bracket supplied, or placed in a cabinet or a wall recess. A hanger or bracket shall be securely anchored to the mounting surface. If a cabinet is used, the door shall not be locked.

8.1.8 Fire extinguishers shall be maintained in accordance with the instructions marked on each extinguisher. Fire extinguishers shall be inspected every 12 months and the date of the inspection recorded in ink on a tag attached to the extinguisher.

8.1.9 The fire extinguisher for a power room, battery room, or engine-driven generator or enclosure described in 11.13.2 shall be located within 3 feet (0.9 m) of the inside or outside of the door or gate. If the engine-driven generator is enclosed as specified in 11.13.6, the extinguisher shall be located within 10 feet (3.05 m) of the enclosure. If the enclosure for the engine-driven generator is provided with a personnel door or gate, the extinguisher shall be located inside or just outside the door or gate, within 3 feet.

8.2 Fire suppression system

8.2.1 If the automation system equipment is located in a separate room or remote signal management center that is not normally occupied by personnel, and it is protected by a fire suppression system using a carbon-dioxide or halogenated or clean agent extinguishing agent, the discharge of the extinguishing agent shall either be automatic and an audible signal shall announce that it has been discharged, or the discharge of the extinguishing agent shall be under manual control. If under manual control, the automation system room shall be equipped with an automatic fire-alarm system that complies with the National Fire Alarm and Signaling Code, NFPA 72, with annunciation in the operating room. Manual discharge is not acceptable in a subsidiary station or redundant site (See 5.2.46).

8.3 Water sheds

8.3.1 A water shed, if not specifically prohibited by the Authority Having Jurisdiction (AHJ), shall be installed over any equipment that is sensitive to water damage if there is a possibility of water damage from overhead, such as the discharging of a sprinkler head. The water shed may be a fixed-in-place deflector, an enclosed rack designed to deflect water from the equipment, or may be a movable waterproof cover or shield installed next to the equipment so that it can be immediately positioned by one person to protect the equipment. A movable waterproof cover shall only be used in a staffed station. Where the staff is not always in the same room as the equipment and the source of the water is a pre-action sprinkler system, the discharge of the sprinkler shall be annunciated to designated personnel trained in the implementation of a written procedure for rapidly positioning the water shed.

8.4 Repeater station fire protection

8.4.1 A repeater station is not required to be provided with fire protection equipment, unless located in a building. A repeater station in a building is not required to be provided with fire protection equipment if it is duplicated at separate sites and signals are able to be relayed through either site.

8.5 Automatic fire-alarm system

8.5.1 A station (See 1.10) shall have an automatic fire-alarm system installed in all areas not continuously occupied by alarm service company personnel. The system shall comply with the National Fire Alarm and Signaling Code, NFPA 72, and shall notify the operators of any trouble or fire condition that is detected.

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents
Document Sharing Hub

9 Standby Lighting

9.1 Fixed standby lighting that is independent of the power source normally used for lighting, and which can be placed into service immediately, shall be provided in:

- a) The operating room of a station;
- b) Each runner and serviceperson station; and
- c) An automation system room or equipment room that is separated from the operating room.

9.2 Fixed standby lighting, or rechargeable flashlights and/or lanterns, that is independent of the power source normally used for lighting, and which can be placed into service immediately, shall be provided:

- a) In a power room; and
- b) For an engine-driven generator(s).

9.3 Independent battery-powered standby lighting units shall comply with the Standard for Emergency Lighting and Power Equipment, UL 924.

9.4 Rechargeable flashlights and/or lanterns shall comply with the Standard for Class 2 Power Units, UL 1310.

9.5 The standby lighting and rechargeable flashlights and/or lanterns shall be tested for a continuous 5-minute period once per month. A record shall be kept of the test.

10 Clocks

10.1 The operating room or remote signal management center, or redundant site, or subsidiary station shall have the means to display local time by any of the following means:

- a) A clock;
- b) A date-time stamp that has the means to visually display the time; or
- c) An automation system that complies with Section 17, Alarm Monitoring Automation Systems.

10.2 Each date-time stamp powered by 120-volt AC shall comply with the Standard for Time-Indicating and -Recording Appliances, UL 863, or with the Standard for Household Electric Clocks, UL 826.

10.3 One of the following means for recording local time and the day, month, and year shall be provided in each operating room, remote signal management center, redundant site, or subsidiary station:

- a) A date time stamp when signals are processed manually or an automation system that is used to process signals and complies with 17.6.1 or 17.6.2.2; or
- b) An automation system that is used to process signals and complies with 17.6.3 or 17.6.4.

10.4 The clocks and time stamps in an operating room, remote signal management center, and a redundant site that is staffed at all times shall be checked daily according to standard local time and, if necessary, reset.

10.5 The clocks and date-time stamps in a subsidiary station or a redundant site, unless they are occupied at all times, shall be checked monthly according to standard local time and, if necessary, reset. See 10.4.

10.6 When primary power has been restored after a power failure, any of the equipment listed below that is powered by primary power shall be checked against and, if necessary, reset to standard local time:

- a) All clocks that display time in the operating room;
- b) All date-time stamps in the operating room; and
- c) All components of an automation system that complies with Section 17, Alarm Monitoring Automation Systems, are used to display or record time, and not automatically synchronized with the United States Naval Observatory's Atomic Clock when power is restored.

11 Power Supply

11.1 General

11.1.1 Electrical power for signaling equipment used in a station shall be provided by methods complying with 11.1.2 – 11.15.5.

11.1.2 Operation of equipment from a secondary power source shall be indicated in the operating room when the switch over to the secondary source is made. This may be done either by an indicator light or by notification via the automation systems.

11.1.3 The configuration of the primary and secondary power sources shall be based on the following:

- a) The manufacturer's specifications for power and the use of an uninterruptible power supply (UPS);
- b) The results of the monitoring equivalent weight (MEW) calculation (See 5.2.36 and 17.2); and
- c) The options for secondary power established in 11.5.1.

11.2 Installation

11.2.1 All power supply equipment (such as batteries, battery-chargers, overcurrent protection, rectifiers, switching facilities, transformers, voltage regulators, power conditioners, emergency generating equipment, uninterruptible power supplies (UPS), engine-driven generator transfer switches, and the like) and wiring shall comply with, and be installed in accordance with, the requirements of the National Electrical Code, NFPA 70, or as required by the local authority having jurisdiction, for such equipment. Where NFPA 70 is not used as the electrical code, power supply equipment shall be installed in accordance with the requirements of a published electrical code, as required by the local authority having jurisdiction, for such equipment.

11.3 Source

11.3.1 Two sources of power shall be provided for operation of the signaling equipment, and other associated equipment necessary for the ongoing operation of the station under all conditions.

11.4 Primary power supply

11.4.1 One primary power supply shall be provided. The primary power supply shall be used to operate the system under any condition except in the case of its failure. The supply shall have the capacity for the intended service and shall consist of:

- a) A commercial light and power service; or
- b) A permanently-installed, engine-driven generator.

11.5 Secondary power supply

11.5.1 A secondary (standby) supply shall be provided to supply energy to the entire load created by the equipment necessary for the operation of the station in the event of failure of the primary power supply. The secondary power supply shall consist of either:

- a) A storage battery or batteries of sufficient capacity to operate the load for a 24-hour period;
- b) A permanently-installed, automatic-starting, engine-driven generator having sufficient capacity to power the load and a storage battery/batteries or UPS with a 4-hour capacity; or
- c) Two or more permanently installed engine-driven generators. With the largest capacity engine-driven generator out of service, the remaining engine-driven generator(s) shall be capable of supplying power to operate the load. More than one of these engine-driven generators may be automatic starting when:
 - 1) They are supplying separate loads; or
 - 2) The starting systems are arranged so that the secondary engine-driven generator will not start unless the primary engine-driven generator fails to start.

Except for the conditions specified in 11.6.1, a standby battery is not required. Only one of the generators shall be automatic-starting.

11.5.2 Provision shall be made to restore equipment used to provide secondary power to service within 72 hours by repair of the equipment or by its permanent or temporary replacement. This shall be accomplished by either:

- a) Employees of the central station company that have been trained in the servicing of power systems; or
- b) Under the terms of a written agreement with a service company that is skilled in the servicing of power systems.

11.5.3 Both the primary and secondary engine driven generators shall be monitored for critical operating functions including but not limited to, low fuel, start failure, over current, high temp and low oil.

11.5.4 If using two or more generators, one shall be an auto start generator. The manual start function of the manual start generator shall have the manual start and stop function controlled from the central station.

11.5.4 effective October 31, 2016

11.6 Continuity of power supply

11.6.1 Rechargeable batteries of sufficient capacity to operate the maximum normal load of the equipment necessary for the operation of the station for at least 15 minutes shall be provided if signals could be lost due to the transfer of power between the primary and secondary power supplies, or if signal receiving units require more than 30 seconds to reset. The rechargeable batteries shall assume the load in such a manner that no signals will be lost if the secondary power is supplied in accordance with:

- a) 11.5.1 (a) or (b) and the transfer is made manually; or
- b) 11.5.1(c).

11.6.2 If signals are not lost due to the transfer of power between the primary and secondary power supplies, the transfer shall be accomplished, either manually or automatically, within 30 seconds of loss of primary power. If more than 30 seconds is required, standby power in accordance with 11.6.1 shall be provided.

11.6.3 When the MEW calculation is 999 or less, the rechargeable batteries described in 11.6.1 are not required to be provided by a UPS (See 11.14) or a UBS (See 11.15) unless the use of such supplies is required by the specifications of the manufacturer of the equipment being used.

11.7 Storage batteries

11.7.1 A storage battery shall be of the long-service, commercial grade, stationary-type, or gelled electrolyte-type and shall be located or enclosed so that signaling equipment cannot be affected by battery gases.

11.7.2 All cells shall be insulated against grounds and crosses, and shall be mounted so as to not be subject to mechanical damage. A rack, frame, or cabinet used to support a battery shall be protected against the corrosive effects of battery gases and liquids.

11.7.3 Battery cells shall be sealed to prevent the venting of gas or the power room or enclosure that houses batteries shall be vented to the outside atmosphere.

11.7.4 Batteries shall be marked with the date that they are installed and on which they are to be replaced based on the life expectancy indicated by the manufacturer's data. Batteries shall be replaced sooner if tests indicate that they should be replaced.

11.8 Overcurrent protection for external batteries

11.8.1 Batteries that are external to the equipment they power shall be protected by enclosed fuses or circuit breakers in the main discharging leads. The overcurrent protection shall be installed as close to the battery terminals as practical.

11.8.2 The current rating of the fuse or circuit breaker shall not be less than 130 percent of the current rating of the charging source. The maximum rating shall not be more than 250 percent of the maximum normal operating load or 200 percent of the current rating of the charging source, whichever is greater.

11.8.3 The overcurrent protection provided as a part of the equipment shall be used if it is an integral part of the equipment.

11.8.4 The rating of a fuse or circuit breaker used in the grounded side of a battery, if provided, shall not be less than twice the rating of the fuse or circuit breaker in the ungrounded side.

Exception: The rating of the circuit breaker in the grounded side may be less than twice the rating of the circuit breaker in the ungrounded side, but not less than that rating, if circuit breakers are used in both the ungrounded and grounded side, and they are mechanically linked (ganged) so that both will be opened if either one is operated.

11.8.5 At least two spare fuses and one spare circuit breaker for every rating that is in use shall be available at the station for replacement use.

11.9 Charging method

11.9.1 Provisions shall be made for charging a battery so that it is protected from damage due to an excessive rate of charge or to the reversal or interruption of the supply current.

11.9.2 Spraying of the electrolyte shall be prevented while the battery is being charged by its charging source.

11.10 Trickle- or float-charged batteries

11.10.1 Battery chargers or DC power supplies of sufficient capacity shall be provided to supply power to all direct current circuits without overloading the charging equipment.

11.10.2 A storage battery of sufficient capacity shall be connected across the line in such a manner that would normally charge the battery, or it shall be in a separate standby condition with an automatic switching means such that the battery would be transferred to operate the system upon failure of the primary power supply. Working circuits shall not be affected by the switchover to standby battery.

11.10.3 Storage batteries that are intended to supply 24 hours of standby power shall be tested either:

- a) Monthly by a 30-minute, normal operating load discharge test; or
- b) On a frequency established by the battery manufacturer.

In either case, the average voltage per cell shall not be permitted to drop below the manufacturer's recommended level.

11.10.4 The discharge test for a battery intended to supply 4 hours or less of standby power shall be tested either:

- a) Monthly by a 5-minute, normal operating load discharge test; or
- b) In accordance with the manufacturer's recommended testing regimen.

The average voltage per cell shall not be permitted to drop below the manufacturer's recommended level.

11.10.5 A record of the test described in 11.10.3 and 11.10.4 and the results shall be created and maintained for a minimum period of 12 months.

11.10.6 If the DC source used to operate the system is also used to maintain the charge for the battery, it shall be capable of providing the maximum load with the battery fully discharged.

11.10.7 The charging current for either a trickle- or float-charged battery shall be such that a completely discharged battery is restored to the required operating charge within:

- a) 48 hours for a battery intended to supply 24 hours of standby power; or
- b) 24 hours for a battery intended to supply 4 hours or less of standby power.

11.11 Battery chargers and DC power supplies

11.11.1 Battery chargers and DC power supplies shall comply with the Standard for Power Supplies for Fire-Protective Signaling Systems, UL 1481; the Standard for Industrial Battery Chargers, UL 1564; or the Standard for Power Units Other Than Class 2, UL 1012.

Exception: This requirement does not apply to battery chargers used to maintain the starting battery for an engine driven generator. See 11.12.10.

11.11.2 Preventive maintenance shall be performed on a battery charger or DC power supply as specified by the manufacturer. The maintenance may be provided under a service contract or by trained central station personnel.

11.12 Stationary, engine-driven generators

11.12.1 An engine-driven generator shall be used only if an operator trained in its use is on duty at all times, unless the requirements of 11.6.1 – 11.6.3 are met.

11.12.2 The installation of a stationary combustion engine shall comply with the requirements of the Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines, NFPA 37, as applied by the local authority having jurisdiction.

11.12.3 There shall be an indication in the operating room when the engine-driven generator is operating. If there is more than one engine-driven generator, there shall be an indication of operation for each. This message shall be delivered to an operator audibly, visually, or via the automation systems.

11.12.4 An engine-driven generator shall be located so that the noise, vibration, fumes, heat, and the like, of its operation shall not interfere with the handling of signals and other duties in the operating room and other functions of the station.

11.12.5 Fuel shall be stored in accordance with local codes or requirements from the local authority having jurisdiction. Where fuel is stored in tanks, they should be located underground whenever possible. Gravity feed of fuel shall not be used unless specifically permitted by the authority having jurisdiction.

11.12.6 When the fuel source is not natural or manufactured gas that is supplied through utility mains, sufficient fuel shall be maintained so as to provide for 12 hours of operation at full-load if a reliable source of supply is available at any time on 2 hours' notice. If a source of supply is not reliable or readily available, a supply sufficient for 24 hours of operation shall be maintained.

11.12.7 If gasoline fuel is used, which deteriorates with age, it shall be supplied from a "working" tank that is frequently replenished, or other means shall be provided to ensure that the gasoline is always fresh.

11.12.8 The units shall be of sufficient capacity to be able to operate the system under the maximum normal load conditions in addition to all other demands, such as standby lighting.

11.12.9 The units shall have sufficient capacity to be able to operate air conditioning, heating, ventilation, and the like, if these functions are essential to the operation of the station.

11.12.10 A separate storage battery and automatic float charger shall be provided for starting the engine-driven generator and shall not be used for any other purpose. The charger shall comply with the Standard for Battery Chargers for Charging Engine-Starter Batteries, UL 1236.

11.12.11 Each engine-driven generator used by a central station, or a remote signal management center that is occupied at all times shall be tested under normal maximum load or through the use of a load bank that has been sized based on the information described in 11.12.13 by one of the following schedules:

- a) Operated under normal maximum load for a period of 30 continuous minutes at a scheduled time every 7 calendar days; or
- b) Where the installation of the generator complies with the Standard for Emergency and Standby Power Systems, NFPA 110 operated under normal maximum load for a period of 30 continuous minutes at a scheduled time every 30 calendar days.

In either case a record of the test and results shall be created and maintained for a minimum period of 12 months.

11.12.12 Preventative maintenance shall be performed on an engine-driven generator as specified by the manufacturer. The maintenance may be provided under a service contract.

11.12.13 The station shall:

- a) Maintain a current list of all the equipment and facilities that are powered by the engine-driven generator(s) and their loads; or
- b) Determine the load by operating the engine-driven generator(s) with all the intended equipment and facilities powered from it. (See 11.12.11).

11.13 Security

11.13.1 Engine-driven generators, power supplies, or batteries that are located in an area of the building not occupied at all times by station personnel, shall be located in a room that is locked and has all movable openings supervised by the station with contacts or the equivalent. Openings in the walls, ceiling, or floor that exceed manhole size [96 square inches (619 cm²) with the smallest dimension exceeding 6 inches (152 mm)] shall be protected with bars or screening as specified in 11.13.2 (a) or (b).

11.13.2 An engine-driven generator, power supply, or battery located in an area of the building that cannot be locked shall be enclosed by one of the following means:

- a) A mesh constructed either of expanded sheet steel at least 0.053 inch (1.4 mm) thick, or 10 AWG (0.102 inch diameter) (5.3 mm²) steel wire, or an equivalent material. Any opening in the mesh shall not be wider than 2 inches (51 mm) when measured in any direction; or
- b) A sheet metal enclosure using either steel or aluminum. Sheet steel shall have a minimum thickness of 0.032 inches (0.81 mm) and shall be provided with corrosion protection by painting, plating, or the equivalent. Sheet aluminum shall have a minimum thickness of 0.045 inch (1.14 mm). All removable panels shall be secured by lock and supervised with contacts by the station.