

# EMERGENCY COMMUNICATIONS: INSPECTION & DESIGN GUIDELINES TO MEET NEW CODE REQUIREMENTS, PART 2

by John Beamish

Beginning with ASME A17.1a-2002, the rules for emergency elevator-communications systems have become a bit more complicated. Unfortunately, the wording in the code is not as clear as it could have been, which has resulted in some confusion as to exactly how these new systems should work. In Canada, the various provinces generally tend to adopt new codes more quickly than U.S. states do. There has been much debate over emergency communications, and this article will attempt to summarize what has evolved in Canada over the last several years. It will hopefully provide some assistance to U.S. inspection authorities, elevator companies and consultants who are now grappling with the implementation of these new rules.

We have divided this topic into four sections:

Section 1: General discussion of what equipment the code now requires

Section 2: Modernization projects

Section 3: Inspection guidelines for elevator authorities

Section 4: Project-management guidelines for elevator companies and consultants

Section 1 was covered in ELEVATOR WORLD's November 2006 issue. Sections 2, 3 and 4 are covered in this article.

## Section 2: Modernization Projects

In which situations must an upgrade to the elevators or telephones comply with the new rules for communication equipment? We have seen many instances in which the elevator contractor was unaware that upgrading a building's telephone system would result in an on-site rescue station also being required. The elevator contractor then ends up absorbing what can end up being

Figure 1

### Safety Code for Elevators

#### Application of Section 2.27

1. All new buildings must provide an emergency elevator communication system that conforms with the operating requirements of Section 2.27.
2. Modernization projects must also comply with the requirements of Section 2.27 if any of the following are applicable:
  - a. There is a change in type of service from freight to passenger or passenger to freight.
  - b. There is a change in the type of motion control (AC, VVVF, DC, SCR, etc).
  - c. There is a change in the operation control (CPPB, Automatic).
  - d. There is an alteration being made to the emergency-telephone equipment. This would include the following:
    - i) Installing a telephone system where no previous form of communication existed.
    - ii) Installing a telephone system to replace or supplement an alarm bell.
    - iii) Installing a telephone system to replace an intercom system.
    - iv) Changing the power source of the telephone equipment. This would include changing a line powered telephone to an AC-powered telephone or changing an AC-powered telephone to a line-powered telephone.

Figure 2

### INSPECTION REPORT

#### Emergency Elevator Communication System

Date \_\_\_\_\_ Building Name \_\_\_\_\_

Address \_\_\_\_\_ City \_\_\_\_\_ # of Elevators \_\_\_\_\_

#### CALLING OUT FROM ELEVATORS

1. Push call button. Wait two seconds then push again. (Phone must not shut off if call button pressed more than once.) Is the call answered by authorized personnel? \_\_\_\_\_
2. Do the authorized personnel know the elevator number and address? \_\_\_\_\_
3. Is there visual indication that the call has been answered? \_\_\_\_\_
4. Does visual illumination extinguish when call is terminated? \_\_\_\_\_
5. For "accessible" buildings, is the height of the activation button between 890 mm and 1220 mm from floor surface? \_\_\_\_\_
6. Is the volume of the phone adequate (60 dbA is normal conversation level) and acceptably free from static for both caller and monitoring personnel? \_\_\_\_\_

#### ON-SITE RESCUE STATION

*Note: Tests 7-11 generally need only be conducted once for the building.*

7. Go to Rescue Station. Have someone initiate call from elevator. Does Rescue Station ring and activate visual indicator to alert rescue personnel that a call is being made? \_\_\_\_\_
8. Answer the call at the Rescue Station. Is communication clear and volume acceptable? \_\_\_\_\_
9. Hang up. Wait several seconds for hands free phone to hang up. Have person in elevator call out again. Confirm that call transfers from Rescue Station to monitoring station within 30 seconds. \_\_\_\_\_
10. From previous question, have caller in elevator stay on line with monitoring station. Following the instructions at Rescue Station, can you pick up handset, call into the cab and cut off the telephone conversation? (Separate intercom and telephone systems are usually not permitted.) \_\_\_\_\_
11. Separately disconnect battery, telephone at AC power at Rescue Station. Do trouble indicators activate? \_\_\_\_\_

#### ADDITIONAL TESTS

12. Call into each elevator from the Rescue Station or over telephone line and confirm that two-way communications can be established. \_\_\_\_\_
13. While connected, confirm that strength of elevator backup batteries (if phone is AC powered) can be determined. \_\_\_\_\_
14. Temporarily set internal timer in one of elevator phones to 2 minutes & activate. When answered, tell the operator to extend call at end of 2 minutes. If they can't, phone is not compliant. \_\_\_\_\_
15. Temporarily program one of elevators to call your cell phone. Answer the call but don't press any keys if you hear voice prompts. If the hands free unit doesn't hang up & redial within 2 minutes, it should not be accepted. \_\_\_\_\_
16. For multi-elevator buildings, call to the permanently staffed location from one of elevators. When the call is answered, activate call button in another elevator. Activate a third phone, if available. If all phones join the same conversation, operator must know where they are all calling from and communications must be clear. A queuing format is also acceptable as long as voice messaging tells operator that a call is waiting. \_\_\_\_\_

a significant bill if brand-new building wiring and the rescue station installed in a finished lobby are necessary.

The rules for modernization projects (Figure 1) have been adopted in some Canadian provinces. We would encourage inspection authorities everywhere to put just as much thought into *when* the new rules must apply as they do to interpreting Section 2.27.1.1 for their particular jurisdiction. As long as an elevator's communication system complies with the code in effect at the time of the building's construction or last major modernization (even if there is no communication equipment at all), it is common practice in most jurisdictions not to retroactively apply new equipment standards. Inspection authorities have told us that while they see elevator communications as being very important, they simply don't want to deal with the potential resistance of building owners being asked to pay for retroactive equipment upgrades. Having said that, we also know that elderly passengers have had to be taken to hospitals for trauma treatment as a result of their being trapped in elevators without telephones, so the retroactivity question is certainly not an easy one to deal with.

**Section 3: Inspection Guidelines for Elevator Authorities**

Over the past few years, Canadian inspection authorities have come to recognize that:

- ◆ the complexity of emergency elevator-communication systems is always increasing.
- ◆ inspectors usually do not have an extensive background in telecommunications.
- ◆ there are significant differences in how the equipment from various manufacturers will operate.

As a result, there is general consensus that having a standardized series of tests for emergency elevator-communication systems is a very good idea, particularly since many operational shortcomings in the equipment are rarely detected by the standard "push the call button and ask the operator if she knows where I'm calling from" test.

In response to regular requests from elevator authorities and consultants, Webb Electronics, Inc. has assembled an inspection report (Figure 2) and a companion document, the inspection guide (Figure 3). This is essentially a set of "best practices" suggestions that we've developed over the last 20 years as specialists in the manufacturing and installation of emergency elevator-communication systems.

Ideally, something similar to these standardized tests would be included in A17/B44 at some point in the not-too-distant future. This would certainly go a long way to ensure that the public has access to a

Continued ►

Figure 3

**INSPECTION GUIDE**  
*Code Requirements & Rationale for Tests*

- 1a. Some brands of hands-free telephone are designed to shut off if the call button is activated more than one time. This is a poor design because it is quite common for distressed passengers to push the button more than once. If they do, it should definitely not result in their emergency call being cancelled. It is recommended that this "on/off" design not be accepted.
- 1b. "Authorized personnel" must be a permanently staffed station where it is guaranteed that calls will be answered 24/7. An on-site concierge or building manager may not qualify in that they may be making rounds and be in an inaccessible location even if calls are forwarded to their cell phone. Ideally, personnel at the answering location should also have some training in dealing with distressed callers and have some multiple language skills should the caller not speak English. Ordinary answering services will often lack the latter capabilities.
2. Authorized personnel must be able to determine exactly where the call is coming from without any assistance from the passenger. Better brands of hands-free telephone usually do this by playing a voice prompt which tells the operator to press "1" to speak to caller or press "2" to hear the location. Properly trained personnel will answer the call, extract the location message and then go into two-way conversation with the caller. They should know your location by the time they are speaking with you.  
  
Some inexpensive brands of hands-free telephone have no voice prompts. They will simply play their recorded location as soon as the monitoring station answers and then go into two-way communications. This does not comply with code because the location message must be delivered "on demand." The reason for this is that callers are regularly put on hold by the monitoring station, which will mean that the location message will have often already played by the time the operator comes on line if one of these inexpensive phones is used. And without voice prompts, they will have no way of knowing how to replay the location message. A good way to test for this shortcoming is simply to ask the operator if they heard any voice prompts when they came on line. If there were no voice prompts or the location message just played without them doing anything, the phone does not comply with the operating requirements for emergency telephones.
3. For hearing-impaired passengers, there must be a visual indicator to show them that their call has been answered. This usually means that the unit is now in two-way mode and they can speak if they wish to. In most systems, this requirement is met by a flashing LED accompanied by written instructions indicating that the call has been answered when the light is flashing.
4. The visual indicator must shut off once the authorized personnel have hung up.
5. In addition to the operating requirements of Section 2.27.1, some buildings may have additional design requirements if they need to comply with accessibility standards for the handicapped. These requirements can include the height of the call button from the floor, the size of the call button and others which are beyond the scope of this document. We have mentioned the call-button height here to draw attention to there possibly being extra accessibility requirements in your building and the fact that some manufacturers regularly put their emergency telephone call buttons below 890 millimeters.
6. Hands-free telephones will either be AC powered or powered by the telephone system. The latter are less expensive to purchase because they do not require a transformer, but they are almost always much quieter. In some buildings, line-powered telephones do not have enough volume for seniors or anyone with a slight hearing impairment to have a clear conversation. The generally accepted volume for normal conversation is 60 dBA. The emergency telephone should be set to provide this volume level and the conversations should be free of external line noise in order for it to be accepted.
7. If the building has been provided with an on-site Rescue Station that rings on outgoing calls, it should create an audible ringing or buzzing sound when there is an incoming call and there should be a visual signal that activates as well. This would generally be a flashing LED.
8. When the elevator call is answered, the Rescue Station must be designed in such a way that it is obvious which elevator is calling. In addition, the conversation must be clear and the volume high enough at the Rescue Station so that the caller can be understood even if there is some background noise near the Rescue Station.
9. Section 2.27.1.1.2 says that if the outgoing call is not answered at the on-site Rescue Station within 30 seconds, it must be transferred to a permanently staffed station either on site or off site. Systems are usually set to ring three or four times at the Rescue Station to satisfy this requirement. It should be noted that some inexpensive systems will ring simultaneously at the Rescue Station and at the permanently staffed station, i.e., they can't ring at one and then switch to the other. The problem with this approach is that if the monitoring station picks the call up quickly, the on-site Rescue Station may not ring long enough for site staff to hear it. For this reason, the design would not comply with the purpose of 2.27.1.1.2.
- 10a. If the passenger is speaking with the permanently staffed location, emergency personnel must be able to go to the on-site Rescue Station, pick up the handset and quickly be in two-way conversation with the passenger. Section 2.27.1.1.4a says that this action shall "override communications to the outside of the building" which is generally interpreted as meaning that the monitoring station should get cut off when the on site link is established.
- 10b. Some contractors may try to install a hands-free telephone for outgoing passenger calls and a separate intercom system for rescue personnel to call from the on-site location into the elevators. This could very easily lead to confusion for the passenger because they could simultaneously experience the operator speaking to them over the telephone speaker and rescue personnel speaking to them over the intercom speaker. Given that the call from on-site rescue personnel must "override communications to the outside of the building," all jurisdictions asked have ruled that having a separate intercom system playing in the background does not comply with the requirements of 2.27.1.1.4a. An "integrated" communication system must be installed which will combine both telephone and on-site intercom functions into a single system.
11. The Rescue Station should be designed in such a way that it will alert building personnel if any of the most common system faults occur. Low or disconnected battery, loss of AC power and loss of telephone line are the main problems that a system will experience. Visual and audible warning signals should be provided. It is also recommended that there be a silence button of some sort provided to mute the audible signal pending the arrival of a repair technician. (The absence of a silencing mechanism could end up being disruptive to the building residents if it were to continue for an indefinite period.) When testing for trouble indicators, it is recommended that each test be done independently, i.e., disconnect the battery, then reconnect it. Then disconnect the AC power, etc.
12. In buildings having an elevator travel over 60 feet, the on-site Rescue Station must have the additional capability of calling into each of the elevators. (Note that elevator travel over 60 feet includes underground travel, so a building with four stories of underground parking would only need two stories above ground in order to qualify for this requirement.) If an on-site Rescue Station has not been provided, it is still important that emergency personnel be able to call into each of the elevators over the phone line, so the "call in test" should be made over the phone system instead of the Rescue Station. Make sure that the system provides voice prompts to guide the caller in how to reach a particular elevator. Without voice prompts it would be completely impractical to expect an emergency operator or elevator mechanic to know which brand of phone is installed in a building and given that all brands are designed differently, to know which sequence of keys should be pressed to access a particular elevator.
13. Backup power in AC-powered hands-free telephones is generally provided by rechargeable ni-cad batteries. The lifetime of these batteries will vary significantly depending on usage, building temperature and a number of other factors. Since they give no warning when they are about to fail, it is very useful if building personnel can simply call into an elevator and check the battery strength.
14. Since they do not have a physical hang up mechanism like handsets do, hands-free telephones have a programmable timer built into them which determines how long the call will last. At the end of the timer period, the phone automatically hangs up. However, the code requires that an operator be able to extend the call at the end of the timer period if they wish to do so. The only practical way for this happen is for the operator to get a voice prompt as the timer is about to expire. The prompt must tell them that the call is about to end and also tell them which key to press if they wish to extend the call.  
  
Setting the internal timer for a long period such as 99 minutes is not an acceptable alternative to the operator being able to extend the call. Sometimes a phone will not get the operator's hang up signal when the operator hangs up which means that the hands free unit is out of service for the remainder of the 99 minutes.
15. It is critical in the design of an emergency telephone to make sure that it can't be fooled into thinking that an operator has answered if it accidentally reaches an answering machine or fax line. It must also be able to hang up and redial if the call has been put on hold for an extended period of time. Unfortunately, some manufacturers have not bothered to build this degree of intelligence into their equipment. This test will simulate both an answering machine and being put on hold, so it will quickly help you determine whether the hands free phone passes this fundamental test of acceptability.
16. With hands-free telephones, communication quality quickly deteriorates when more than one unit is having a conversation at the same time. Often if two or more units are trying to speak on the same line simultaneously, there is too much echoing and feedback for anyone to hear anything. Unfortunately, in a power outage, it is very likely that multiple calls are going to be attempted at the same time, so it is very important that the equipment be designed in a way that everyone is able to communicate clearly and the operator can easily identify their individual locations.

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Figure 4

**PROJECT MANAGEMENT CHECKLIST**

*Emergency Elevator Communication System*

Building Name \_\_\_\_\_

Address \_\_\_\_\_

Contractor \_\_\_\_\_ Contact \_\_\_\_\_ Tel \_\_\_\_\_

Owner / Prop Mgr \_\_\_\_\_ Contact \_\_\_\_\_ Tel \_\_\_\_\_

**EMERGENCY TELEPHONES**

Brand \_\_\_\_\_ Model \_\_\_\_\_ # of Phones \_\_\_\_\_

Company installing the telephones \_\_\_\_\_

Warranty on equipment \_\_\_\_\_

Do these phones meet local requirements? (See Webb Inspection Report for suggested operating criteria) \_\_\_\_\_

Does fixture manufacturer have mounting details for the phone? \_\_\_\_\_

Scheduled installation date(s) \_\_\_\_\_

**ON SITE RESCUE STATION**

Is an on site rescue station required so emergency personnel can communicate with the elevators? \_\_\_\_\_

Brand (should be same as phone): \_\_\_\_\_ Model: \_\_\_\_\_ Location: \_\_\_\_\_

Company installing the Rescue Station (It is recommended that this be same company that is installing phones) \_\_\_\_\_

Warranty on equipment \_\_\_\_\_

Estimated installation date \_\_\_\_\_

Does it need to first ring on outgoing calls? \_\_\_\_\_

If so, how many rings before call is transferred to permanently staffed location \_\_\_\_\_

Are there any other locations on site where a remote handset should be installed which will operate in parallel with the Rescue Station handset? \_\_\_\_\_

Are there any machine room telephones required? \_\_\_\_\_

For larger buildings, will an expansion station be required to tie into the main Rescue Station? \_\_\_\_\_

If so, where will it be located? \_\_\_\_\_

**BUILDING WIRING**

Who is responsible for provision of system wiring? (owner, elevator co, etc) \_\_\_\_\_

Contractor(s) doing the wiring \_\_\_\_\_

Scheduled installation date \_\_\_\_\_

Type of wire recommended by manufacturer \_\_\_\_\_

**MONITORING**

Who is providing 24 hour monitoring? \_\_\_\_\_

Who is setting up the monitoring contract, if one is required? \_\_\_\_\_

If calls are going off site, is a dedicated phone line being provided? \_\_\_\_\_

If so, who is responsible for ordering the line? \_\_\_\_\_

Date for telephone line to be installed \_\_\_\_\_

If an existing site line is to be shared, what is the line presently being used for? \_\_\_\_\_

What is the telephone number of line to be shared? \_\_\_\_\_

Contractor to be installing line sharing equipment, if required \_\_\_\_\_

Do you wish to activate the self-diagnostic function? (Webbphones only) \_\_\_\_\_

If so, who is responsible for providing information to service provider? \_\_\_\_\_

**NOTES**

\_\_\_\_\_  
 \_\_\_\_\_  
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reliable and effective emergency-communications product wherever and whenever they ride in an elevator. In our opinion, this is not always the case at present. The main reasons for this are that elevator contractors often look to purchase the most inexpensive telephone available, and that inspectors are under such severe time constraints that they don't do a thorough enough test to detect some of the more common shortcomings of "budget" telephones. Hopefully, this document will help to raise the bar somewhat in terms of acceptable system performance.

**Section 4: Project-Management Guidelines**

Along with the increasing complexity of emergency-communication systems comes greater challenge in keeping all aspects of the installation project organized. The checklist presented here (Figure 4) is one that we both use ourselves when running installation projects and provide to elevator contractors and consultants when they are coordinating their own projects.

*The opinions expressed herein are based on over 20 years of performing field installation and repair to all brands of telephone (not just Webb Electronics products), so we have developed very good insight as to what works well in the field and what doesn't. However, having said that, we don't know everything, so we'd be happy to hear from any readers who would like to bring any omissions or errors to our attention. Contact information is phone: (604) 501-6652, fax: (604) 501-6653 or website: [www.webbelectronicsinc.com](http://www.webbelectronicsinc.com).*

**John Beamish** is president of Webb Electronics Inc., a Canadian manufacturer and installer of emergency elevator-communications systems. With branches in Toronto, Montreal and Vancouver as well as a U.S. distribution center, the company works closely with elevator authorities to help ensure that uniform standards are developed and applied consistently. Webb Electronics is a member of the Canadian Elevator Contractors Association, and Beamish is a member of the ASME A17/B44 Emergency Operations Committee.