ULC S 537-04 VERIFICATION OF FIRE ALARM SYSTEMS

PART # 6
SYSTEM MODIFICATIONS

Presentation for
CFAA Vancouver Seminar
October 14, 2010
by Ken Baird,
Vice President, Systems Engineering
Leber|Rubes Inc.
Fire Alarm System Modifications

• When modifying an existing fire alarm system
  - What Codes and Standards apply
  - What Permits and inspections are required
  - Who can perform the work
  - What validation of the changes are required
  - How to deal with emergency repairs
Fire Alarm System Modifications

• Building Code requires new fire alarm systems to be
  - installed per ULC S 524 and
  - verified in accordance with ULC S 537

• Fire Code requires existing systems to be
  - Tested annually per ULC S 536

• When new components, features or changes to a system are implemented the initial verification is no longer valid
  - In order to maintain system validation under the Fire Code the changes must be verified in accordance with ULC S537 Part #6
Fire Alarm System Modifications

Permits

- Building Permit
  - Generally municipalities require a Building Permit when changes or additions are made to a life safety system
  - Verification of work per ULC S 537 required on completion and inspection and acceptance of the Authority
  - A permit will ensure that inspection will be conducted on completion
  - If a system fails, generally immediate emergency corrective with a Building Permit application after completion
Permits cont’d

• Electrical Inspection
  - An electrical permit and inspection is required whenever
  ▪ New wiring and raceway is installed
  ▪ Existing wiring is extended or changed
  ▪ New panel or transponder is installed
  ▪ Interface additions or changes to connections to other building systems
Fire Alarm System Modifications

• Who may perform fire alarm system modification work
  - Generally a trained (certified) technician can
    ▪ Replace existing devices on a one for one basis with the same or new type of device
    ▪ Change/replace fire alarm panel/transponder components including batteries
    ▪ Modify/change programming including software, firmware etc.
    ▪ Verify changes made to system including those by a certified electrician
  - Generally a certified or limited license electrician is required to
    ▪ Transfer wiring from an old panel to a fire alarm panel
    ▪ All conduit and wiring, new, extended or rerouted plus installation of all new devices
Fire Alarm System Modifications

- **ULC S 537 Section #6**
  - Identifies specific verification requirements for all system additions, changes & modifications
6.1 Field Devices

- Where field devices are added to an existing system, verification shall ensure that the:
  
  A. Added devices are compatible with the control unit and other devices
  B. Loading of the circuit has not been exceeded
  C. Emergency power provided is of sufficient capacity
  D. The input circuit to output circuit operation including ancillary device circuits shall be tested for correct program operation as per design and specifications
6.2 Conventional Device Modifications

- Where a conventional field device is added or modifications or deletions are made to an existing input circuit or output circuit and the new or altered wiring is extended from an existing field device, the new device(s), the device connected on either side of the addition or alteration as well as the end of line for that circuit shall be verified.

![Diagram showing speaker zone and new speaker added]
6.2 Conventional Device Modifications.. Cont’d..

- Where a conventional field device is added or modifications or deletions are made to an existing input circuit or output circuit and the new or altered wiring is extended from an existing field device, the new device(s), the device connected on either side of the addition or alteration as well as the end-of-line for that circuit shall be verified in accordance with this Standard.

New speaker added
6.3 Field Device Replaced
• Where a field device is replaced, the device shall be verified in accordance with this Standard

5. VERIFICATION PROCEDURE – FIELD DEVICES

5.1 GENERAL

5.1.1 Each field device shall be inspected and tested to confirm operability, including the following functions, as applicable (Refer to Appendix C6, Field Device Record):

New speaker replaced in existing back box
6.4 Wiring Extended From a Junction Box

- Where a conventional field device is added or modifications or deletions are made to an existing input circuit or output circuit and the new, modified or altered wiring is extended from a junction box, all devices served by that circuit shall be verified in accordance with this Standard.

All the devices connected on that circuit shall be verified.

New speaker added and wired from a junction box.

Note: This requirement pertains to situations where a new device is extended from a junction box containing multiple connections from a single or multiple circuit.
# Fire Alarm System Modifications

## 6.5 DCL Added

- Where a *data communication link(s)* is added to an existing system, all new and existing *field devices* connected to that *data communication link(s)* shall be verified in accordance with this Standard (Refer also to Clause 6.11.)

## 6.11. Software modifications shall be tested by one of the following methods:

- **A.** Re-verifying all system functions that could be affected by the modifications with the exception of wiring supervision; or

- **B.** A comparison of the ‘before’ and ‘after’ *software* utilizing mediums such as a printout or compare program.

---

*New DCL added for additional detection devices*
Addition, modification or deletion of active field device(s) and supporting field device(s), to an existing data communication link shall require verification of the new or altered device(s). In addition, either an operational test of all devices connected to that data communication link shall be performed, or the correct sequence as identified in Clause 6.11 B. shall be confirmed.

6.11.

B. A comparison of the ‘before’ and ‘after’ software utilizing mediums such as a printout or compare program.
6.7 Control Unit or Transponder Added

6.7 Where a control unit or transponder is added to an existing system, the control unit or transponder and all new and existing field devices connected to it shall be verified in accordance with this Standard. (Refer to Clause 6.10.)

6.10 Modifications to a control unit or transponder and those circuits affected shall require the modifications to be verified in accordance with Subsection 4, Verification Procedure – Control Units & Transponders.

4. VERIFICATION PROCEDURE – CONTROL UNITS & TRANSPONDERS

4.1 GENERAL

4.1.1 Each control unit and transponder shall be inspected and tested to confirm operability, and that the installation is in accordance with the design and CAN/ULC-S524, Standard for the Installation of Fire Alarm Systems. Refer to Appendix C5, Control Unit or Transponder Record)
6.8 Existing Control Unit Replaced

6.8 Where an existing fire alarm system control unit or transponder is replaced with a new control unit or transponder, it shall be verified in accordance with Subsection 4, Control Units & Transponder, and any existing devices shall be tested in accordance with Section 5.7 (Field Devices) of CAN/ULC-S536, Inspection and Testing of Fire Alarm Systems. (Refer also to Clause 6.11.) of ULC S 537

4. VERIFICATION PROCEDURE – CONTROL UNITS & TRANSPONDERS

4.1 GENERAL

4.1.1 Each control unit and transponder shall be inspected and tested to confirm operability, and that the installation is in accordance with the design and CAN/ULC-S524, Standard for the Installation of Fire Alarm Systems. Refer to Appendix C5, Control Unit or Transponder Record

5.7 FIELD DEVICES

5.7.1 General

5.7.1.1 Each field device shall be inspected and tested to confirm the following, as applicable:

A. Free of damage;
B. Free of foreign substances (e.g. paint);
C. Mechanically supported independent of wiring; and
D. Protective dust shields or covers removed.
# Fire Alarm System Modifications

## 5.7 Field Devices - Identification

<table>
<thead>
<tr>
<th>Location</th>
<th>Device Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Closet 1A</td>
<td>SFD</td>
<td>Supports 1st FLR Fire Devices</td>
</tr>
<tr>
<td>Corr. Adj. Room 1A</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Janitor’s Closet 1C</td>
<td>HT</td>
<td></td>
</tr>
<tr>
<td>Adj. East Stair</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Corr. Adj. Room 123</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Adj. Fire Panel</td>
<td>SFD</td>
<td>Isolates 1st FLR Fire Devices</td>
</tr>
</tbody>
</table>

### Example Diagram:

- **Supporting Field Device**
- **Conventional Field Device**
- **EOL**
6.9 Control Unit Module or Assembly Replaced

- Where a module or assembly is replaced in the control unit or transponder the module or assembly shall be verified for its intended function.
6.10 Control Unit or Transponder Circuit Modifications

4. VERIFICATION PROCEDURE – CONTROL UNITS & TRANSPONDERS

4.1 GENERAL

4.1.1 Each control unit and transponder shall be inspected and tested to confirm operability, and that the installation is in accordance with the design and CAN/ULC-S524, Standard for the Installation of Fire Alarm Systems. (Refer to Appendix C5, Control Unit or Transponder Record)
6.11 Software Modifications

- Software modification shall be tested by one of the following methods:
  A. Re-verifying all system functions that could be affected by the modification with the exception of wiring supervision; or
  B. A comparison of the ‘before’ and ‘after’ software utilizing mediums such as a printout or compare program.
Fire Alarm System Modifications

6.12 Update Verification Report

- A description of the changes made and the verification report shall be attached to the original verification report

<table>
<thead>
<tr>
<th>Location</th>
<th>Device Type</th>
<th>Correct Install</th>
<th>Alarm Oper</th>
<th>Annunciation</th>
<th>Circuit #</th>
<th>Sensitivity</th>
<th>Flow Delay</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Closet 1A</td>
<td>SFD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Supports 1st FLR Fire Devices</td>
</tr>
<tr>
<td>Corr. Adj. Room 1A</td>
<td>S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Janitor’s Closet 1C</td>
<td>HT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adj. East Stair</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corr. Adj. Room 123</td>
<td>S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adj. Fire Panel</td>
<td>SFD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Isolates 1st FLR Fire Devices</td>
</tr>
</tbody>
</table>
Fire Alarm System Modifications

• The intent of the requirements in Section #6 is to reaffirm the validity of the original system verification based upon the changes being made
• Section #6 of ULC S 537 identifies how to deal with changes, additions or deletions to existing systems and identifies the extent of the verification required
• In some cases a number of these clauses may apply based upon the system changes made
• Remember the additional verification information needs to be submitted to the client, be appended to the original verification records and retained at site by the “owner”
Thank you for your attention

Ken Baird,
Vice President, Systems Engineering
Leber|Rubes Inc

kbaird@LRIfire.com
www.LRIfire.com