Summary of Changes
CAN/ULC-S524-06
Installation of Fire Alarm Systems

Alan Cavers
Area Manager
Fire & Security Systems Group

- Correct Deficiencies noted CAN/ULC-S524-01
- Clarification S524-01 Edition
- Glossary of Terms
- Control Units and/or Transponders - Added
- New Section on Fault Isolation Modules
- Data Communication Links - Clarified and Expanded

To make this Standard easier to interpret.
**NBC Requirement**

- 3.2.4.5.(1) – Fire alarm systems, including the voice communication capability where provided, shall be installed in conformance with CAN/ULC-S524, “Installation of Fire Alarm Systems.”

---

**Requirements of Fire Alarm Systems**

- 3.1.1 – A fire alarm system shall consist of at least the following interconnected devices: a control unit, a manual station and an audible signal device.
- 3.1.2 – A fire alarm system may include devices such as fire detectors, visible signal devices, annunciators and other equipment required to provide voice communication capability.

---

**Requirements of Fire Alarm Systems**

- 3.1.3 (f) Devices and equipment used in a fire alarm system, and the interconnection to the fire signal receiving centre shall comply with CAN/ULC-S561, The Standard for Installation and Services for Fire Signal Receiving Centres and Systems
- 3.1.4 – All devices incorporated in a fire alarm system shall be compatible.
- 3.1.5 – Ancillary devices connected to a fire alarm system shall not interfere with the operation of the fire alarm system.
3.1.6 – Where ancillary devices are powered by a fire alarm system, the primary power supply and emergency power supply of the fire alarm system shall be of sufficient capacity to operate both the fire alarm system and the ancillary devices.

3.1.9 – Receiving an alarm input normal to off-normal status change shall cause the fire alarm system to perform the required function.

3.1.10 – Control units and/or transponders arranged for single stage operation shall comply with the following: (Reference Table 2)

- 10 Second Response Time
  - (Audible & Visual Signal Devices, Interconnection to Signal Transmitting unit, Releasing Devices, Annunciation, CACF, Ancillary Circuit)
- 90 Seconds - Trouble
Requirements of Fire Alarm Systems

3.1.11 – Control units and/or transponders arranged for two stage operation shall comply with the following:

A. A first stage signal input normal to off-normal status change shall result in an alert signal. Activation of all or selected alarm signal devices connected to the system shall operate within the response time as detailed in Table 2;

B. All other functions, such as interconnection to the signal transmitting unit, releasing device service start of sequence, annunciation, central alarm and control facility annunciation and ancillary devices or circuit functions shall perform as intended within the response time as detailed in Table 2; and

C. Initiation of a second stage signal input normal to off-normal status change, either manual or automatic, shall result in alarm signalling within response times as detailed in Table 2.

Power Supply

3.2.1.1 – Two independent power supplies shall be provided; one primary and one emergency, in accordance with the NBC

- Dedicated power source
- Continuous Supply under full load

- Clarified- No real Change
Primary Power Supply

3.2.2.1 – Power supplied to the fire alarm system shall be provided from a separate dedicated circuit, except where a distributed type system is provided as described in Clauses 3.2.1.5 and 3.2.3.2.

Label Stating – One or more sources of power.

3.2.2.2 The primary power supply shall be capable of continuously supplying power for operating the fire alarm system under the installed full load condition.

Emergency Power Supply

3.2.4.1 – Where the emergency power supply is an engine-driven generator, it shall be installed in accordance with CSA C282, “Emergency Power Supply for Buildings,” or CAN/CSA-Z32, “Electrical Safety and Essential Electrical Systems in Health Care Facilities.”

Clarification

Emergency Power Supply

3.2.5.1 – Batteries providing the emergency power supply shall conform to Clauses 3.2.5.2 through 3.2.5.4 and to CSA C22.1, Canadian Electrical Code, Part I, “Safety Standard for Electrical Installations,” pertaining to batteries.

Clarification
3.3.1.2 - Fire alarm system devices connected in an electrically supervised circuit shall be connected so that removal or disconnection of any device shall cause a trouble signal to be initiated.

Clarification

3.3.1.3 – In Class A circuit wiring, DCL style A and DCL style C wiring, the primary wiring circuit and the alternate wiring circuit shall be installed in separate raceways or cable assemblies having a minimum separation of 300 mm where the cables are installed vertically and 1200 mm where the cables are installed horizontally, except under the following conditions:

A. Single conduit/raceway drops to individual field devices; or
B. For a distance not to exceed 3000 mm where the primary and return conductors enter or exit the field devices, control unit or transponder enclosures;
C. Single conduit/raceway drops to multiple field devices installed within a single room not exceeding 100m².
Exceptions

A. Single conduit/raceway drops to individual field devices, or
B. For a distance not to exceed 3000 mm where the primary and return conductors enter or exit the field devices, control unit or transponder enclosures;
C. Single conduit/raceway drops to multiple field devices installed within a single room not exceeding 100m².

Trouble Signals

- 3.3.2.3 – An audible trouble signal shall continue to sound until manually silenced or until the trouble condition is restored to normal.

Reminder

Defining Trouble

Wiring Methods

- 3.4.10 – Field wiring entry points for the various circuits and circuit separations shall in accordance with the manufacturer’s installation instructions and CSA-C22.1, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations, Section 12, Wiring Methods.

- Explanation- Reinforcing this section
- Installations in field that do not meet code (No ground, No Conduit, etc.)
3.5.1.E – The plans and specifications for the fire alarm system shall include a complete and detailed description of the connection to a fire signal receiving centre, if required by the NBC.

3.5.4 - Documentation for the FAS shall include the following description of the FAS

A. Instructions for resetting the system and silencing the alarm signals;
B. Instructions for silencing the trouble signal and action to be taken when the trouble signal sounds;
C. Description of the function of each operating control and indicator on the fire alarm unit;
D. Description of the area of fire zone protected by each alarm detection circuit (this may be in the form of a list or plan drawing);
E. Description of the sequence of operation;
F. Description of ancillary devices controlled by the fire alarm system;
G. Equipment operating instructions or manuals; and
H. Equipment maintenance or testing instructions.
New Documentation Requirements

- 3.5.5 – The documentation required by Clauses 3.5.1 to 3.5.4 shall be maintained on site.
- Requirement exists in S536 and S537.
- Fire Alarm System File.

Installation of Fire Alarm Equipment

- 4.1.1 – Clear space shall be maintained in front of control units and transponders equal to the width of the door, but not less than 1000 mm, to provide access for maintenance and testing.

- 4.1.2 – The top of control units and transponders shall be not more than 2400 mm above the finished floor level.
- 4.1.3 - Legend or operating controls shall be not more than 1800 mm above the finished floor level.
New DCL Requirements

4.2.4 – Where control units or transponders utilize DCLs, the loading requirements of Table 3 shall apply as follows (sub-clause A to D):
- Table 3 - Capacities of Systems Utilizing Data Communication Links within a Single Building has been revised.
- New figures, Figures 2-1, 2-2, 2-3, 2-4 and 2-5 that show schematics.

Data Communication Link (DCL)

- Terminology change S524-01 DCLR has been changed in S524-06 to DCLC.
- DCL Style C – A data communication link style with a primary wiring and an alternate wiring circuit with operational characteristics as detailed in Table 1 – Performance of DCL.

Table 1 – Performance of DCL

<table>
<thead>
<tr>
<th>Abnormal operating condition in a link at the same location</th>
<th>DCLA</th>
<th>DCLB</th>
<th>DCLC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Open</td>
<td>S</td>
<td>T</td>
<td>S</td>
</tr>
<tr>
<td>Single Ground</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Wire to wire short</td>
<td>T</td>
<td>T</td>
<td>S1</td>
</tr>
<tr>
<td>Wire to wire short and ground</td>
<td>T</td>
<td>T</td>
<td>S1</td>
</tr>
<tr>
<td>Open and ground</td>
<td>S</td>
<td>T</td>
<td>S</td>
</tr>
<tr>
<td>Loss of communication</td>
<td>T</td>
<td>T</td>
<td>T</td>
</tr>
</tbody>
</table>

T-Trouble indication at the control unit; S-Trouble indication at the control unit and alarm receipt capability during abnormal operation; S1-Trouble indication at the control unit and alarm receipt capability (beyond the isolated fault section of the link) during abnormal operation.
### DCL Style A
- Redundant Loop - Class A Wiring
- Separate Loop for each zone
- Extra Wiring
- Multiple Trunks

### DSL Style A

### DCL Style B
- Class B Wiring Methods
- Use of EOL’s
- No Back up or return loop
- Loose entire loop
DCL Style B

Class A with Isolators

Separate/identify the problems

Other circuits not affected

Zone Separately

DCL Style C

DCL Style C
New DCL Requirements

4.2.4.D – The types of initiating devices to be considered when establishing the total number of connected devices shall include active field devices and supporting field devices. Conventional field devices monitored by a supporting field device are not considered in the maximum DCL capacity.

- DCL A = 300
- DCL B = 200
- DCL C = 300

Large Scale Networks

4.3 – Requirements for Large Scale Network Systems revised.
- Operation in Degraded Mode
- Standalone capability
- Requirements for DCL between Control Units and Transponders

Fire Separation

4.3.7 – Each control unit and transponder shall be located in an electrical service room and/or central alarm and control facility separated from the remainder of the building by a 1 h fire separation.

Note: Multiple control units or transponders installed in the same room within 18m of each other, which are interconnected to operate as a single unit, may be considered as a single control unit or transponder.
Installation of Fire Alarm Devices

- Section Revised
- Better Directions for installation – Clarification

5.2.1 – Manual stations shall be installed not less than 1200 mm and not more than 1400 mm above the finished floor level measured from the centre of the manual station. REVISED

5.2.5 – Manual stations shall be installed on both sides of a series of doors exceeding 12 m in total width, and within 1500 mm of each side of the opening. NEW

Audible Signal Devices

- 5.4.1.1 – Where ceiling heights allow, audible signal devices shall be installed so that the top of the device will not be less than 2300 mm above the finished floor level.

Exception: This requirement does not apply to in-suite signaling devices with integral silence means.
5.4.1.2 – Wall-mounted audible signal devices shall be installed at least 150 mm below the ceiling, measured to the top edge of the device.

New Section

5.4.1.7 – Audible signal devices within a building shall generate similar sounds and sound patterns when activated.

Section Reworded

5.4.5.2 - Two or more visible signal devices in corridors or rooms in the same field of view shall flash in synchronization.

5.4.5.3 – Wall-mounted visible signal devices shall be installed such that the entire lens is not less than 2000 mm and not more than 2400 mm above the finished floor.
5.6.1.3 - Each fire detector shall be accessible for periodic maintenance and testing. Where spot type fire detectors are not readily accessible due to safety considerations (e.g. continuous process operations, energized electrical equipment, radiation, and excessive height) alternate methods of detection shall by utilized (e.g. beam type smoke detector or aspiration type smoke detector).

Updated Section - Takes in consideration where to install detectors.

5.7.2.2 – A clear space of at least 450 mm shall be maintained between a spot type fire detector and any obstruction, except as specified in Clause 5.7.2.3. (Refer to Figure 4). Obstructions and protrusions not exceeding 100 mm from the ceiling need not be considered as impinging on this clear space.
Mounting of Fire Detectors

5.7.2.3 – Spot type fire detectors shall be installed on the ceiling not less than 100 mm from the wall, measured to the edge of the detector, except as permitted in clause 5.7.5.1.1.

Mounting of Fire Detectors

5.7.2.4 – Spot type fire detectors shall not be located in a direct airflow or closer than 450 mm from an air supply outlet or from an air exhaust outlet measured to the edge of the detector.

Spot Type Smoke Detectors

5.7.5.1.1 - Spot type smoke detectors may be installed on the wall 100 to 300 mm from the ceiling, measured to the edge of the detector.
5.7.5.3.3 – Interior horizontal exit passageways forming exit stair shafts exceeding 18 m in height shall be provided with spot type smoke detectors in accordance with Clause 5.7.1.1 and Subsection 5.7.3.7, Corridors.

5.7.5.3.4 – When spot type smoke detectors cannot be used due to abnormally low ambient temperature, below 0°C, appropriate fixed temperature spot type heat detectors may be installed.

5.14 – New Section
5.14.2 - Fault isolation modules shall be utilized when entering and leaving each fire alarm zone, as required by the National Building Code of Canada.
5.14.3 – Except as noted in 5.14.4, fault isolation modules, shall be located in a separate enclosure, installed so as to be visible and accessible at all times, and located beyond the last device in the data communication link serving that floor area.

5.14.4 – Fault isolation modules incorporated in a field device shall be mounted in accordance with the requirements of the field device.

Note: Field devices incorporating fault isolation modules complying with Clause 5.14.2 do not require additional dedicated fault isolation modules.
5.14.5 – Where a fire separation is provided, fault isolation modules required by Clause 5.14.2 shall be installed on each side of that fire separation.

5.14.6 – Fault isolation modules installed on opposite sides of the same fire separation shall be offset horizontally to a minimum of 400 mm, and not located within the same stud space.

5.14.7 – Where no fire separation is provided between each NBC required fire alarm zone, a single fault isolation module shall be utilized when isolating zones within the same floor area. Note: This Clause would be applicable to large horizontal buildings. For example, warehouses, shopping malls, factories, etc.
5.14.8 – Fault isolation modules serving a single field device in an exit or vertical service space shall be installed on the floor area side. Note: Fault isolation modules are not required on the exit or vertical service space side.

5.14.9 – Fault isolation modules shall have an identifying mark or label on the cover plate or field device. The identifier shall be visible after installation. Where field devices incorporating fault isolation modules are used to comply with Clause 5.14.2, the first field device entering and the last field device leaving each fire alarm zone shall be marked.

New fire alarm system requirement
3.1.3.(J) – Devices and equipment used in a fire alarm system, and the interconnection to the fire signal receiving centre, shall comply with CAN/ULC-S561, “Installation and Services for Fire Signal Receiving Centres and Systems.”
5.15 – New section

5.15.1 - The interconnection wiring from the fire alarm control unit or transponder to the fire signal receiving centre shall comply with CAN/ULC-S561, Installation and Services for Fire Signal Receiving Centres and Systems. Refer to Appendix E, Responsibility Demarcations, for examples of responsibility demarcations.
Ordering ULC Standards

- ULC publications including Standards, Directories and ORDs are available via the ULC Online Store. Payment is accepted by VISA, MasterCard, or American Express. All products on the ULC Online Store are available in hardcopy only.
- http://www.ulc.ca/ABOUT_ULC/Order_STANDARDS.asp

Questions

Thank You For Attending

For more information on a private or public seminar on this topic or many other topics please go to:

http://uluniversity.com/ca

Or call
1-888-503-5536

Or Contact
Linda Savo – Manager, Customer Training
416-757-5250, Ext. 61222