
BULLETIN 2004-001-EL/BU

APRIL 19, 2007
(Revised)

ELECTRICAL SUPERVISION OF FIRE ALARM SYSTEM DEVICES AND SIGNAL TO A CENTRAL STATION AND FIRE DEPARTMENT

This bulletin clarifies the Vancouver Building By-law (VBBL) requirements in respect to electrical supervision of a fire alarm system, supervisory devices, trouble signals on the FA annunciator and signals to a central station or to a fire department as follows:

I). Electrical Supervision (trouble signals and supervisory devices/conditions):

- (1) Article 3.2.4.9. of Division B of the VBBL mandates **electrical supervision** for a fire alarm system.
- (2) Section 3.3 of ULC S524-01 lists fire alarm system components (wiring to the devices) that must be provided with **electrical supervision**.
- (3) In addition to the list of fire alarm system devices required to be supervised in conformance with Section 3.3 of ULC S524, Clause 7-7.1 of the NFPA 96 states that where a commercial cooking operation is equipped with an automatic fire-extinguishing system in accordance with the NFPA 96 criteria, **electrical supervision of this fire-extinguishing system must be provided on the FA annunciator**.
- (4) Paragraph 3.3.1.5 of ULC S524 explains that every abnormal condition such as an open circuit fault or a ground fault on each circuit of a FAS must be indicated by a **trouble signal**, and that the **trouble signal** shall not interfere with the operation of other circuits (i.e. shall not interfere with a **fire alarm initiating, audible or visual signals**).
- (5) Clause 3.3.3 of ULC S524 provides requirements for operation of **trouble signals** (identification, audible and visual components, silencing, etc.).
- (6) ULC S524 does not define a "**supervisory signal**" as a separate entity, but provides a definition of a "**trouble signal**" as "a visual and audible indication of equipment failure, circuit failure, fault condition or operational malfunction". However, ULC S524 defines a "**supervisory device**" as "a field device to signal a condition that could prevent proper operation of a fire protection system", and defines "**tamper device**" as "a device used to detect the removal or opening of a protective cover". Thus, any abnormal condition such as a short or open circuit, or operation of a supervisory/tamper device must be indicated on a fire alarm annunciator (see 3.3.3.1 of ULC S5240 by a trouble signal.

Thus, any abnormal condition which could be manifested by a short or open circuit, or by operation of a supervisory/tamper device must be indicated on a fire alarm annunciator (see 3.3.3.1 of ULC S524) by a **distinctive trouble signal**.
- (7) The City of Vancouver has recognized the fact that a "**supervisory signal**" is not defined and not used in the ULC S524 (it appears that the ULC S524 intends to identify trouble conditions and supervisory conditions by a "**trouble signal**"). Thus, Sentence 3.2.4.9.(2) of Division B of the VBBL has been amended accordingly to reflect this fact and to provide consistency with the ULC S524.

- (8) Sentence 3.2.4.9.(2) of Division B of the VBBL covers electrical supervision requirements for all applicable components of an automatic sprinkler system and this Sentence specifically mandates a **dedicated trouble signal** on the FA annunciator for each **following supervisory function or condition listed in paragraphs (a) to (g)**:
- a) movement of a valve handle that controls the supply of water to sprinklers;
 - b) loss of excess water pressure required to prevent false alarms in a wet pipe system;
 - c) loss of air pressure in a dry pipe system;
 - d) loss of air pressure in a pressure tank;
 - e) a significant change in water level in any water storage container used for fire fighting purposes;
 - f) loss of power to any automatically starting fire pump; and
 - g) a temperature approaching the freezing point in any dry pipe valve enclosure or water storage container used for fire fighting purposes.

In addition to the listed supervisory functions (a) to (g) it has been recognized by the City of Vancouver that a heat-tracing cable system may be used to protect a sprinkler system against freezing, provided that the heat-tracing cable system meets requirements of the revised Bulletin 2000-016-EL/PL. If such a heat-tracing cable system is permitted, then a **separate common trouble signal** must be indicated on the annunciator for each heat tracing cable system designed to provide a reliable operation of fire protection systems (standpipe and sprinkler) in the building. This **single common trouble signal** is sufficient, as the heat tracing control panel would have to be provided with separate electrical supervisory functions for each condition as outlined in Clause 8 of Bulletin 2000-016-EL/PL.

- (9) A **single common trouble signal** from a fire pump may also be sufficient for the purpose of paragraph 3.2.4.9.(2)(f) of Division B of the VBBL, provided that **each supervisory condition** mandated by Article 7-4.7 of the NFPA 20 is **separately indicated on the fire pump controller**, approved for "fire pump service". Supervisory conditions mandated by the NFPA 20 are as follows:
- a) "pump or motor running";
 - b) "loss of phase";
 - c) "phase reversal";
 - d) "controller connected to alternate source"

- Notes:*
- a) *Where a unique supervisory condition required to be identified by a separate trouble signal on the fire alarm annunciator in accordance with Sentence 3.2.4.9.(2) of the VBBL is reflected by a number of similar supervisory devices (i.e. by a number of similar tamper switches in various valve handles, etc.), this supervisory condition may be represented on the FA annunciator by a single trouble signal, only if the Registered Professional Electrical Engineer responsible for the design of the fire alarm system can demonstrate to the Electrical Inspections Branch that such a grouping of these supervisory devices via a single trouble signal, will enable facilitation of efficient troubleshooting.*
 - b) *Use of a common trouble signal on the FA annunciator from a fire pump as indicated in item (9) above, should be discussed by the FAS designer with the Electrical Inspections Branch on the project by project basis.*

II) Signals to a Central Station and to a Fire Department:

- (1) Sentence 3.2.4.9.(3) of Division B of the VBBL has been amended to clarify that activation of a trouble signal that identifies any supervisory function or condition of the sprinkler system (see items (7) to (9) above) must transmit a signal to an independent central station only. (and not to the Fire Department as mandated by the BCBC). The Central Station would be able to immediately notify a building owner/manager of an abnormal condition on the FAS. (There is no reason to send a trouble signal to a Fire Department and to dispatch fire fighters upon acknowledgment of an abnormal condition on a sprinkler system).

Note: Although the VBBL does not mandate a transmission of a trouble signal identifying an open circuit or ground fault condition on FAS components or wiring, this approach is encouraged as it is consistent with good fire protection engineering practice.

- (2) Where a signal to the Fire Department is required in conformance with Article 3.2.4.7 of Division B of the VBBL (assembly occupancy with occupant load exceeding 300, actuation of a first stage in a two stage FAS, actuation of a waterflow device), the FAS must be designed so, that actuation of any waterflow device (a sprinkler flow switch) will be separately transmitted to the Fire Department via a Central Station - to allow fire fighters to know that the fire alarm has been, in fact, initiated by a building sprinkler system which has commenced its fire suppression action.

D. H. Jackson, P.Eng.
DIRECTOR OF INSPECTIONS AND
DEPUTY CHIEF BUILDING OFFICIAL

A.Z. Tsisserev, P.Eng.
CHIEF ELECTRICAL INSPECTOR
AND CITY ELECTRICIAN