Annex G Supervisory Control and Data Acquisition (SCADA)

This annex is not a part of the requirements of this NFPA document, but is included for informational purposes only.

(A) General. Where provided, the general requirements in (A)(1) through (A)(11) shall apply to SCADA systems. The SCADA system for the COPS loads shall be separate from the building management SCADA system. No single point failure shall be able to disable the SCADA system.

(1) The SCADA system for the COPS loads shall be separate from the building management SCADA system.

(2) No single point failure shall be able to disable the SCADA system.

(3) The SCADA system shall be permitted to provide control and monitor electrical and mechanical utility systems related to mission critical loads, including, but not limited to the following:
   a. The fire alarm system
   b. The security system
   c. Power distribution
   d. Power generation
   e. HVAC and ventilation (damper position, airflow speed and direction)
   f. Load shedding
   g. Fuel levels or hours of operation

(4) Before installing or employing a SCADA system, an operations and maintenance analysis and risk assessment shall be performed to provide the maintenance parameter data

(5) A redundant system shall be provided in either warm or hot standby.

(6) The controller shall be a programmable logic controller (PLC).

(7) The SCADA system shall utilize open, not proprietary, protocols.

(8) The SCADA system shall be able to assess the damage and determine system integrity after the "event."

(9) The monitor display shall provide graphical user interface for all major components monitored and controlled by the SCADA system, with color schemes readily recognized by the typical user.

(10) The SCADA system shall have the capability to provide storage of critical system parameters at a 15-minute rate or more often when out-of-limit conditions exist.

(11) The SCADA system shall have a separate data storage facility not located in the same vicinity.

(B) Power Supply. The SCADA system power supply shall comply with (B)(1) through (B)(3):

(1) The power supply shall be provided with a direct-current station battery system, rated between 24 and 125 volts dc, with a 72-hour capacity.

(2) The batteries of the SCADA system shall be separate from the batteries for other electrical systems.

(3) The power supply shall be provided with a properly installed surge-protective device (TVSS) at its terminals with a direct low-impedance path to ground. Protected and unprotected circuits shall be physically separated to prevent coupling.

(C) Security Against Hazards. Security against hazards shall be provided in accordance with (C)(1) through (C)(6):

(1) Controlled physical access by authorized personnel to only the system operational controls and software shall be provided.

(2) The SCADA system shall be protected against dust, dirt, water, and other contaminants by specifying enclosures appropriate for the environment.

(3) Conduit and tubing shall not violate the integrity of the SCADA system enclosure.

(4) The SCADA system shall be located in the same secure locations as the secured systems that they monitor and control.

(5) The SCADA system shall be provided with dry agent fire protection systems or double interlocked preaction sprinkler systems using cross-zoned detection, to minimize the threat of accidental water discharge into unprotected equipment. The fire protection systems shall be monitored by the fire alarm system in accordance with *NFPA 72®-2007, National Fire Alarm Code®*.

(6) The SCADA system shall not be connected to other network communications outside the secure locations without encryption or use of fiber optics.

(D) Maintenance and Testing. SCADA systems shall be maintained and tested in accordance with 585.60(D)(1) and (D)(2).

(1) Maintenance. The maintenance program for SCADA systems shall consist of the following components:

(1) A documented preventive maintenance program

(2) Concurrent maintenance capabilities, to allow the testing, troubleshooting, repair, and/or replacement of a component or subsystem while redundant component(s) or subsystem(s) are serving the load

(3) Retention of operational data — the deleted material goes well beyond requirements to ensure proper maintenance and operation

(2) Testing. SCADA systems shall be tested periodically under actual or simulated contingency conditions.

FPN No. 1: Periodic system testing procedures can duplicate or be derived from the recommended functional performance testing procedures of individual components, as provided by the manufacturers.

FPN No. 2: For more information on maintenance and testing of SCADA, see NFPA 70B-2006, *Recommended Practice for Electrical Equipment Maintenance.*