

## SECTION 40 96 45.16 – PROCESS CONTROL SOFTWARE FOR FIRE FIGHTING CONTROL SYSTEMS

### 1.01 SUMMARY:

A. **Scope:** This Section covers the performance requirements, design, supply, development, installation, training, testing, commissioning, and technical support for complete process control systems (PCSs) of the fire fighting control systems [as part of the Works](#). This Section of the Employer's Requirements shall be read in conjunction with the Sections listed in Table 40 96 45.16-1.

B. **Related Sections:**

TABLE 40 96 45.16 - 1: RELATED SECTIONS		
1.	Section 01 81 26	- Communications, Control, Safety, and Security Systems.
2.	Section 01 86 13	- Plant Mechanical Systems and Equipment.
3.	Section 40 00 00	- Process Systems Integration.
4.	Section 40 95 13	- Process Control Hardware.
5.	Section 40 96 45	- Process Control Software.
6.	Section 40 96 45.13	- Process Control Software for LMCS.

### 1.02 REFERENCES:

A. **Applicable Publications:** Refer to Section 01 81 26 (Communications, Control, Safety, and Security Systems), Paragraph 1.02.

### 1.03 REQUIREMENTS:

A. **Fire Fighting Control System Operation Description:** This PCS shall be designed using a human-machine interface (HMI), non-redundant programmable logic controller (PLC) to slave PLC configuration. The following shall be the system's key features:

1. The main control building PLC shall act as the fire fighting control system (FFCS) operation master. Each firefighting equipment room (FER) shall be managed by a single slave PLC. The slave PLC shall provide positive acknowledgement to the HMI that a command signal has been received.
2. <sup>A16</sup>The machinery control station (MCS) HMI shall manage the startup trigger for any FER as described by the HMI requirements.<sup>A16</sup> The Machinery Diagnostics Station (MDS) HMI shall monitor the FFCS's health.
3. A network communications failure shall only affect the related FER start trigger or start cancel, in which case the system shall be started or start cancelled locally at the related FER. Once started remotely or locally, the slave PLC shall operate all FER machinery regardless of network communication health.

4. Once started, system shutdown shall be only available from the local FER control. However, certain automatic functions shall be able to partially shutdown the system as follows, if the foam concentrate is exhausted:
  - a. The concentrate valves shall close and the concentrate pump shall shutdown.
  - b. The control valves feeding water to the nozzles and the chamber outlets shall close to avoid diluting the applied foam.
5. A command for a coverage area startup, shall convey the command coordinated, to pumps on opposite Lock walls, so that a single pump starts at a time.
6. A flush-out procedure of all water/concentrate-mix pipe sections with water shall be automated and manually triggered locally. Flushing shall be indicated in the HMI while active. The flush-out macro may also be invoked by the local operator as needed without prior use of foam concentrate.
7. **Remote Reset:** In the event of a breaker trip or a motor starter trip, the system shall be capable of resetting them remotely by means of user request. The remote reset feature on a particular device shall permit attempts up to three instances per hour. If limit is exceeded, the remote reset feature shall be disabled until user physically presses the reset button on the related machinery local control panel.

**B. Instrumentation and Indication:**

1. Manual valves shall not require instrumentation. Valves shall be locked out by means of a pad lock.
2. Motorized valves shall have position indication.
3. Motor and motor starter shall comply with instrumentation requirements for electromechanical machinery as specified in Section 40 91 00 (Primary Process Devices), and shall include all hardware required for described indication herein.

**1.04 DESIGN CRITERIA / SYSTEM PERFORMANCE:**

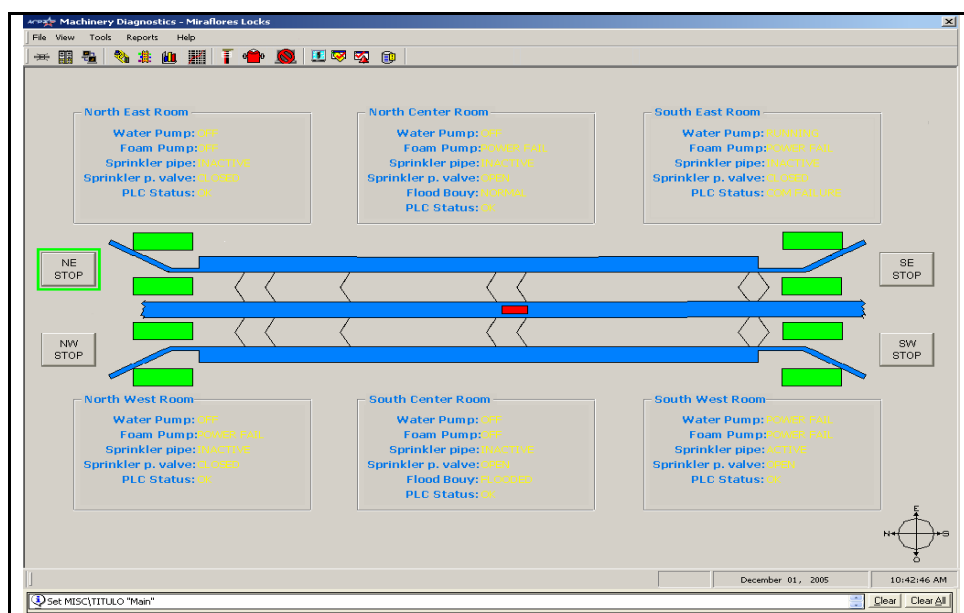
**A. General:**

1. **Problem to be Solved:** FFCSS Software (S/W) shall solve the following business needs:
  - a. To provide software for the Third Set of Locks Project that emulates or improves the performance of FFCSS software at existing locks, which is the same as in Section 40 96 45 (Process Control Software).
2. **Restrictions to be Considered:** (reserved)

- B. Fire Fighting Control System (FFCS) Software:** The FFCS shall be an interactive HMI application used exclusively to monitor process values, generate alarms, reset faults, datalog and trend process values, analyze data, diagnose problems, suggest solutions, output reports and data, and access and generate work orders to external computerized maintenance management system (CMMS) application. System activation control shall only be available through the MCS HMI.

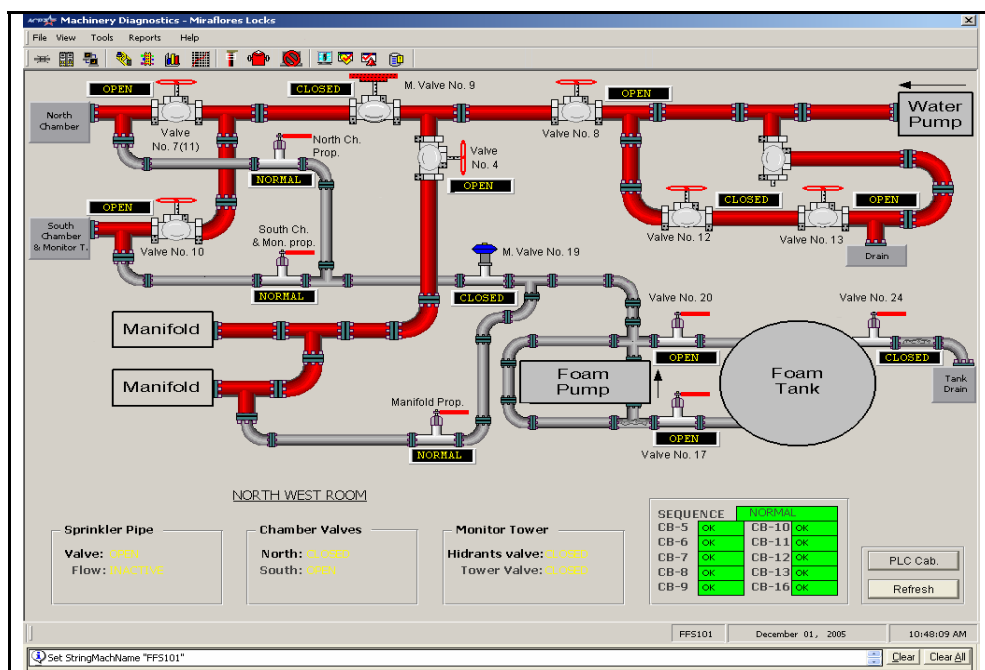
**1. General:**

- a. The main display shall be designed to run on the largest desktop possible without requiring a second monitor. Multiple page-displays or scrolling displays shall be acceptable. It shall consist of a title bar, a menu bar, a tool bar and a status bar, always visible and consistent throughout the application.
  - b. Where an Active-X object for a device or function is expected, and such object is not available for the device or function, the pop-up display shall be developed in its place to allow display of device variables and configuration or to do the required function.
  - c. No command confirmation dialog windows shall be necessary.
2. <sup>A16</sup>**Title Bar:** See requirements for MCS.
  3. **Menu Bar:** See requirements for MDS. <sup>A16</sup> The FFCS HMI shall be a sub HMI available through the MDS, by selecting "View" from the menu bar or by selecting a button on the tool bar, see Figure 40 96 45-1, FFCS Display.
  4. <sup>A16</sup>**Tool Bar:** See requirements for MDS.
  5. **Status Bar:** See requirements for MDS. <sup>A16</sup>



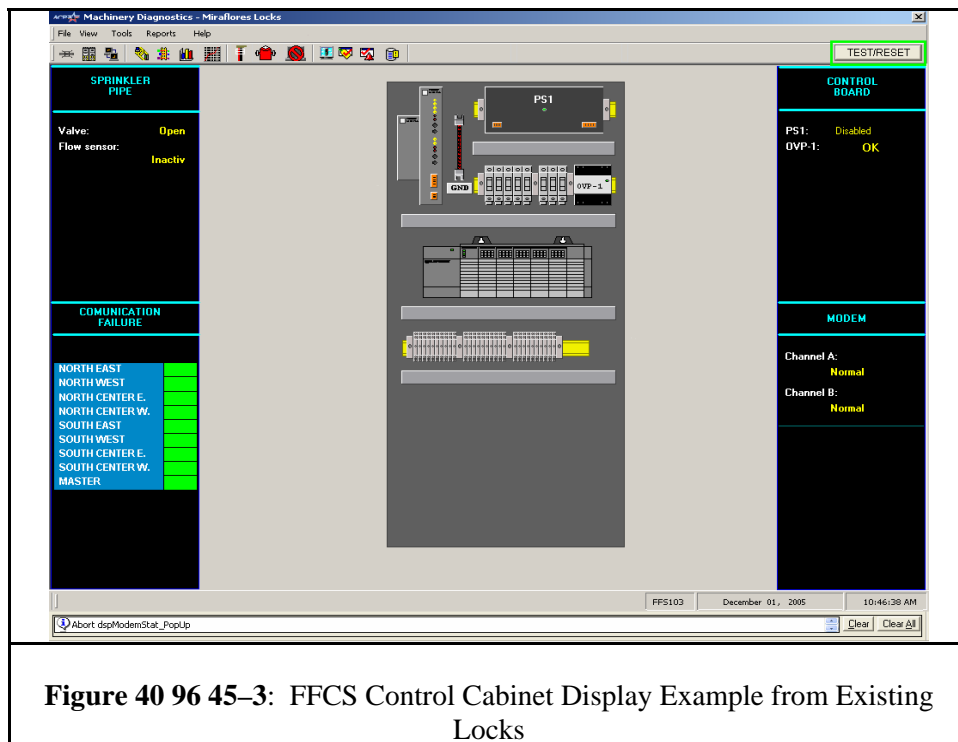
**Figure 40 96 45–1: FFCS Main Display Example from Existing Locks**

6. **The FFCS Display:** Shall show the current FFCS status, by FER. The status displayed shall include information of water pump (on/off), foam concentrate pump (on/off), mayor valves status (opened / closed), communications status (ok, weak or fail) and PLC status (warning or shutdown faults present). Also, on this screen, each FER shall have a “Flushing in Progress” indication. By clicking on the respective FER, the HMI application shall display the FER display, see Figure 40 96 45–2.



**Figure 40 96 45–2: FER Display Example from Existing Locks**

7. **The Firefighting Equipment Room (FER):** This display shall show the pipe arrangement of the water, foam concentrate, and mixture, as well as tank levels and pipe flows, pipe pressures, all of which shall be animated to indicate analog status. Motorized valves depictions are differentiated from the manual valves, and analog position status shall be shown. Motorized valve positions and FER circuit breaker status shall also shown, see Figure 40 96 45–3, FFCS Display.
8. <sup>A16</sup>**The Control Cabinet Display:** See requirements for control cabinet arrangement under the MDS. <sup>A16</sup>



**Figure 40 96 45–3: FFCS Control Cabinet Display Example from Existing Locks**

9. **Macros:**

- a. **Fire Protection Quadrant Start:** This macro shall activate the startup sequence that triggers the FFCS operation after and adjustable delay.
- b. **Fire Protection Quadrant Start Cancel:** This macro shall cancel the startup sequence that triggers the FFCS operation.

**1.05 SUBMITTALS:** Shall be in accordance with Section 40 00 00 (Process Systems Integration), Paragraph 1.05.

**1.06 QUALITY ASSURANCE:** Shall be in accordance with Section 40 00 00 (Process Systems Integration), paragraph Paragraph 1.06.

**END OF SECTION**

**THIS PAGE NOT USED**