Preparing Activity: NAVFAC

Superseding
UFGS-08 71 63.10 (February 2021)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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ELECTRICAL LOCKING CONTROL FOR BRIGS

11/22

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SECTION 08 71 63.10

ELECTRICAL LOCKING CONTROL FOR BRIGS
11/22

NOTE: This guide specification covers the requirements for locking control systems which control all electrically controlled hardware and motorized gates and doors, including but not limited to solenoid locks.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

NOTE: The system monitors and annunciates the status condition of electrically equipped hardware, doors, gates, control conditions, security conditions, call-in signals, and other functions as specified herein.

NOTE: Show the following information on the project drawings:

1. Location of locking control panels.

2. Electrified door hardware.

3. Homerun indications from electrified door hardware to appropriate locking control panel.

****

PART 1 GENERAL

1.1 REFERENCES

****

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

****

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C37.90.1	(2013) Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 1	(2022) Standard for Industrial Control and Systems: General Requirements

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2023) National Electrical Code

1.2 SYSTEM DESCRIPTION

1.2.1 System Components

Configure the locking control systems from locking control panels, logic units, relay terminal equipment, and wiring.

a. Locking control panels: Provide mounting for various control

switches, audible annunciators, and visual annunciators which provide control and annunciation interface between the staff and the locking control system.

b. Logic units: Provide logic transactions necessary to implement the functional operation of the locking control system.

c. Relay terminal equipment: Provide relay terminal equipment, with terminal facilities for field wiring and relay equipment for the conversion of low energy system control to high energy control signals, as necessary to control and operate devices as specified in this section.

1.2.2 General Control and Annunciation

The following paragraphs describe the operation for various devices controlled and annunciated at locking control panels.

1.2.2.1 Hardware

****
NOTE: Coordinate with door schedule shown in the architectural drawing.
****

Provide operational and annunciation provisions for each electrically controlled and monitored hardware set as specified herein. Refer to architectural door schedule for door hardware information. Provide hardware type in accordance with Section 08 71 63 DETENTION HARDWARE.

a. Annunciation: Annunciate each door and gate equipped to be monitored and controlled in the following manner. Single red indicator on the locking control panel illuminates on nonsecure condition at the door or gate. On swing doors and gates, the annunciation occurs on the first movement of the locking mechanism. Door and gate position switches causes the annunciation on nonsecured position. Monitor secured status of controlled doors and gates by either two or more position switches which include but are not limited to door on gate position, lockbar position, roller bolt position, latch-bolt position, and motor limit switches. Annunciate nonsecure condition by any one nonsecure switch on a given hardware set.

b. Cell and shower door solenoid: Where cell doors are equipped with solenoid locks, the following operation applies. Pressing the "unlock" switch of an "unlock - lock" pair of membrane switches on a locking control panel causes the hardware to unlock and remain unlocked until the "lock" switch is pressed. When the "lock" action is taken, the lock bolt extends, regardless of whether the door has been opened or not, except on deadbolt locks. Group unlock provisions must allow hardware to be held unlocked.

c. Corridor and miscellaneous solenoid: Where corridor and other doors are equipped with solenoid locks, and the specific door operation is not given elsewhere in this section, the following operation applies. Pressing the "unlock" switch of an "unlock/lock" pair of membrane switches on a locking control panel causes the hardware to unlock and remain unlocked until the "lock" switch is pressed. When the "lock" action is taken, the lock bolt extends, regardless of the door having been opened or not, except on deadbolt locks.

d. Key relock doors solenoid: Where fire egress doors are equipped with hardware which, when electrically unlocked, requires a key action at the door to relock, the following operation applies: Unlocking the door requires the simultaneous pressing of two unlock membrane switches. Releasing the switches on the locking control panel causes the operating power to return to the locked state.

e. Deadbolt solenoid locks: Where doors are equipped with electrically operated deadbolt locks, the operation is as specified for solenoid locks on noncell doors, except the bolt must not extend until the controls are in the "lock" condition and the door is closed.

f. Motorized overhead gates: Where motor operated gates are installed, the following operation applies. Pressing the "open" momentary action switch causes the gate to travel to the locked open position unless the "stop" momentary action switch is pressed, which will stop the travel of the gate. Pressing the "close" momentary action switch causes the gate to travel to the locked closed position unless the "stop" switch is pressed. Pressing the "open" or "close" switch while the gate is traveling in the opposite direction must have no effect.

1.2.2.2 Hardware Related Functions

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NOTE: Architectural door schedule should indicate those doors that require interlocking.

****

****

NOTE: Specify night secure function for housing unit locking control panels that control prisoner cells and shower doors.

****

a. Group control: For pretrial and female locking control panels requiring group operation of hardware, the following operation applies: Pressing the "open" or "unlock" membrane switch causes hardware in the associated group to unlock and cause the group control red LED to illuminate. Pressing the "off" switch causes the hardware to react to the condition required by the individual hardware controls, and the group annunciator extinguishes. On group unlock, solenoid locks unlocks in half second intervals.

b. Interlocks: Where two or more doors with electric hardware form a Sallyport or where interlocks between hardware sets occur, the operation of the individual hardware sets are as specified in this section with the following modifications. The controls must allow only one of the hardware sets to be in the nonsecured condition at any given time unless the interlock bypass function is activated. Upon simultaneously pressing the two interlock bypass switches, the red interlock bypass LED flashes on panels which control hardware in the same interlock scheme and allow the operator to control hardware with no interlock restrictions. By pressing the interlock bypass switch the second time, the interlock scheme reactivates. Provide locking control panels controlling interlocked doors with the interlock bypass switch and annunciator provisions. An amber "interlock active" LED illuminates on panels controlling hardware in a given interlock scheme when one or more of the interlocked doors are nonsecured. A separate

annunciator for each interlock scheme on each controlling panel annunciates the "interlock active" condition. Once an interlock scheme has become active, activation of other unlock controls for hardware in the same scheme must have no effect and where the controls are specified as maintained contact devices and more than one has been placed in the unlock condition while the interlocks are active, upon resecuring of the original hardware one and only one of the additional doors will open in response to the multiple unlock switch position. Upon simultaneous operation of central devices in an interlock scheme, one and only one will cause a hardware set to become nonsecure.

c. Monitored doors and gates: Doors which are equipped with hardware which monitors the secure status and are not electrically operated, is monitored in the following manner: The door or gate red LED functions as specified for annunciation above, except as described in this paragraph. Control panels monitoring monitored-only doors and gates provides night secure provisions. The night secure provisions secures all doors and gates unless specific groups are required. Once the doors or gates are secured, this function alerts the control officer of unsecured conditions. Pressing the night secure switch on membrane switch panels causes the secure mode to become active and the secure green LED to illuminate. Upon activation, hardware in the nonsecure condition or hardware which becomes nonsecure causes an audible alarm to sound and the status LED for the nonsecure hardware to latch illuminated until reset. Pressing the silence switch silences the audible alarm. The secure function annunciates subsequent alarms audibly and visually in the manner specified above. Pressing the secure reset switch releases latched indicators, extinguish the secure green LED, and return the panel to normal operation.

d. Shower and cell call-in: For the shower and cell doors in the pretrial and female areas, the following operation applies: Pressing the momentary action pushbutton in the cell or shower causes an amber LED associated with the cell or shower on the locking control panel to flash and an audible signal sounds. Pressing the control panel momentary action silence switch on the control panel silences the audible signal and cause the LED to illuminate constantly. Pressing the control panel momentary action call-in reset switch extinguishes the LED. Once an individual cell or shower has been received at the control panel and has been silenced, additional activations of the same cell or shower call-in switch must have no effect. Silencing one call-in will not inhibit other calls from being received.

e. Control panel enable/disable keyswitch: Equip the locking control panel located at the reception counter with a keyswitch mounted on the front that enables and disables the locking panel control functions.

1.2.3 Battery Power

Provide batteries, complete with charging system as back-up power, in the event of a utility and emergency power failure. Provide adequate capacity to supply locking control system electrical load for a period of four hours. On restoration of utility or emergency power, the batteries must automatically be recharged. Battery backup provides power to support input status and LED annunciations, output controls, and memory retention. Battery backup power is not required for power source which actually operates the locking door or gate hardware.

1.3 SUBMITTALS

****

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force, and NASA projects, or choose the second bracketed item for Army projects.

****

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Locking Control Systems

Security Equipment Cabinets

Graphic Locking Control Panels

Linear Locking Control Panels

SD-03 Product Data

Control Devices

Light Emitting Diodes

Audible Signal Devices

Control Power Transformer

Batteries

Auxiliary Relays

DC Power Supply

Wiring Materials

Submit specifications and data sheets.

SD-07 Certificates

Locking Control System Components

Submit manufacturer's certificates attesting that materials meet specified requirements.

SD-08 Manufacturer's Instructions

Graphic Locking Control Panels

Linear Locking Control Panels

Security Equipment Cabinets

Submit construction specifications.

SD-10 Operation and Maintenance Data

Locking Control Systems, Data Package 2; G[, [_____]]

Submit operation and maintenance data in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA. Include as-built wiring diagrams complete with conductor color codes, conductor number, and termination identification. General system descriptions included in manufacturer's catalogs or advertising media will not be acceptable in meeting the operation and maintenance manual requirement.

1.4 QUALITY ASSURANCE

Programmable controller must be the product of a manufacturer engaged in the production of controllers for industrial applications.

1.4.1 Drawing Requirements

Submit installation drawings and wiring diagram for the overall system and for each of the following major components. Show how each item of equipment will function in the system and include an overall system schematic indicating relationship of components. Prior to preparation of drawings, review the electrical and operational characteristics of each electrically controlled and monitored hardware. Include a layout of

devices to be installed in nongraphic locking control panel. Include cabinet dimensions, full dimensional drawings, and layout of equipment to be installed within security equipment cabinets. Include full dimensional drawings of graphic panels and nongraphic panels. Include layout of each display panel at a minimum of one-half full scale illustrating graphic layout orientation for area and position of devices required in console, as well as dimensional drawing of housing.

1.5 EXTRA PARTS

1.5.1 Programmable Controller

At final inspection, furnish one spare controller composed of one fully equipped processor, 1 percent space I/O interface boards (minimum of one), and 1 percent spare I/O modules (minimum of one of each type used).

1.5.2 Erasable Program Read-Only Memory (EPROM)

Provide one spare EPROM loaded with the proper software for each programmable controller and located with the controller in a protective enclosure. Mark the enclosure "SPARE EPROM" and physically identify the EPROM for use in the specific controller.

PART 2 PRODUCTS

2.1 LOCKING CONTROL PANEL COMPONENTS

2.1.1 Switches

Provide unembossed, nontactile, momentary contact membrane-type switches for control devices installed in the graphic and linear panels. Provide operating force of membrane-type switches of 2.22 N 8 ounces. Supply membrane switches with silver contacts and proper circuitry to perform functions as specified in this section. Supply membrane switches in modules with no more than four individual switches in each.

2.1.2 Light Emitting Diodes (LED)

Provide T 1 3/4 light emitting diodes (LED) visual indicators with resistors and protective diodes as required for operation at 24 volts dc. Provide indicators rated at a minimum of 4 million hours of operation at 20 milliamps dc and produce a minimum of 147 and 570 lumens/watt for red and yellow devices, respectively. Size resistors saccording to the manufacturer's instructions and adjusted to produce uniform brightness among LEDs. Mount resistors and protective diodes on standoff terminal blocks mounted adjacent to the LED served on the underside of the panel. Mounting hardware must not be visible from the face of the panel. Resistors and protective diodes may be an integral part of the LED. Include a red LED in the panels for each electrically controlled and monitored door.

2.1.3 Press to Test

Each locking control panel must contain a "press to test" pushbutton which tests visual and audible signal devices.

2.2 GRAPHIC LOCKING CONTROL PANELS

****

NOTE: Provide graphic type locking control panels for housing unit control panels that control prisoner cell, shower, or for locking control panels that control remote doors such as exterior doors. Specify linear type for all others.
****

2.2.1 Metal Control Cabinets

Provide graphic panel for locking system controls for installation in metal control cabinets as specified in this section. Custom build each graphic panel for the specific area to be controlled.

2.2.2 Construction

Construct graphic panel of 14 gage sheet steel with 38 mm 1 1/2 inch flange on all sides and cover for mounting devices hinged to frame at top. Provide continuous piano-type hinge. Secure panel to metal control cabinet with flathead, No. 8, 38 mm 1 1/2 inch flathead wood screw steel bolts on centers not exceeding 200 mm 8 inches. Overall general dimensions indicated are maximum dimensions. Coordinate mounting dimensions and support requirements with metal control cabinet installation.

2.2.3 Finish

Prime finish surfaces of the graphic panel, except that portion containing the graphic display, with rust inhibiting paint and two coats of hammertone finish gray enamel. Attach a reverse silkscreen polyester plastic film or lexan panel with nomenclature set forth in this specification to the graphic panel.

2.2.4 Graphic Display - Floor Plan Area

Provide graphic display of building floor plan area containing locking devices to be controlled. Display must graphically illustrate each electric-operated locking device to be controlled and also include legends of 5 mm 3/16 inch high letters in contrasting color. Provide graphic display in accordance with typical graphic display panel indicated, modified as required for the specific area and orientation of the building to be controlled. Scale of the graphic display may not be less than 3 mm per 300 mm 1/8 inch per foot. Make display with not more than eight colors.

2.2.5 Wiring

Group wiring on underside of graphic display and lace with nylon tie straps, support on intervals a maximum of 200 mm 8 inches and terminate on identified terminal blocks at top of panel adjacent to hinged side. Strand wiring spanning hinge on conductors. Terminate conductors with crimp-type lugs of both sets of terminal blocks. Leave 150 mm 6 inches of slack in conductors.

2.2.6 Graphic Display - Central Control Room

Provide a facility site plan graphic display of central control room main graphic locking panel. Control or monitor exterior doors from this panel.

2.3 LINEAR LOCKING CONTROL PANELS

2.3.1 Linear Panels

Provide linear panels as indicated and as specified to control groups of designated electric-operated locking devices. Manufacture and install linear locking control panels with same type materials and process as graphic locking control panels and identical except that graphic floor plan display is not required.

2.4 WIRING REQUIREMENTS

2.4.1 Power Wiring

Provide No. 14 THWN or XHHW conductors for solenoid-operated lock sets operating at 120 volts. Connect solenoid-operated lock sets operating at 24 V ac or dc with No. 16 MTW conductors.

2.4.2 Control Wiring

Provide class one signaling circuits as defined by Article 725 NFPA 70 for status indicator wiring. Install No. 16 MTW conductors in common conduit and equipment enclosures with other conductors for locking devices within limitations defined by Article 725-15 NFPA 70.

2.4.3 Wiring Materials

Use solid copper conductors for wiring systems. Stranded conductors will be acceptable only where all terminations can be made to screw type lug. Where stranded conductors are used, make all terminations with crimp type lug, size correctly for termination, and apply to conductor with crimping tool intended for use with lug used.

2.4.4 Color Coding

Color-code wiring systems, providing each conductor for individual lock sets and operating mechanisms with a distinctive color. Use white only for neutral conductors, and use green only for grounding conductors.

2.5 DISCRETE ELECTRONIC LOCKING CONTROL SYSTEM

2.5.1 Logic Units

Discrete electronic locking control system consisting of logic units in the form of printed circuit boards, relay terminal equipment, and associated hardware and wiring. Control system must accept input control information from and send output status information to graphic and linear type locking control panels.

2.5.2 Printed Circuit Boards

Logic units provided with circuitry necessary to perform the functions as specified. Mount circuit boards in a card cage frame, arranged to allow front and back access. Provide wiring connections to printed circuit boards capable of being connected to allow field replacement of printed circuit board with no disconnection or desoldering of wiring. Rack mount card cage frame in security equipment cabinets.

2.5.3 Relay Terminal Equipment

Consisting of electronic relays that switch the power wiring for locking and control devices. Control relays must be optically isolated, solid state type devices, rated for at least 50 percent more than connected load, capable of handling all connected load voltages, and provide a minimum of 2500 volts root mean square (RMS) isolation. Group and lace wiring with nylon tie straps, supported in intervals not to exceed 200 mm 8 inches and terminated on identified terminal blocks. Rack mount relay terminal equipment in security equipment cabinets.

2.6 PROGRAMMABLE CONTROLLERS

Programmable controllers may be provided in lieu of discrete electronic locking control for locking control, door monitoring, annunciation and other specified functions. Provide all necessary logic functions, timing functions, input points, output points, memory, communication capabilities and software for the operating features specified in this section. Individual input/output, (I/O), interface boards and I/O modules are considered part of the controller even if physically separated. Controller must be general purpose in nature, not custom designed and built for an isolated application, and not location specific in its construction. Controller may be made location specific and operationally customized by installing EPROM with applicable software and making the I/O interface boards system specific by setting the proper address via DIP switches or plug-in headers, and installing the proper I/O modules.

2.6.1 Logic Functions

Include, but do not limit to logical AND, OR, and INVERT functions implemented in sufficient levels to provide specified operating features. Arrange logic in such a manner as to prevent unsecure conditions from arising as a result of power failure to part or all of the control power system.

2.6.2 Timing Functions

Include, but do not limit to on-delay, off-delay, pulsing and stepping functions with programmable timing in sufficient variations and quantities to provide specified operating features.

2.6.3 Input/Output

Plug-in mounted on the I/O interface boards and held securely by screw type fasteners. Provide I/O modules as solid state devices providing a minimum of 2500 volts RMS (root means square) isolation. Provide output point modules rated for both voltage and load of device controlled including constant duty and inrush currents. In the event of power failure, output points controlling electrical locks and gates must fail in the secure condition, except shower points. Provide input point modules compatible with input device and voltage connected.

2.6.4 Software

Provide system and operating software and fixed data base contained in erasable program read only memory. Provide operating data base contained in random access memory backed up with a minimum of 48 hours of rechargeable batteries. Charge must be maintained by the controller. Develop operating software for each controller on an individual basis.

2.6.5 Processor

Controller processor communicates to and from the I/O interface boards via a multipair, bidirectional communication bus incorporating digital multiplexing techniques. Communications facilities must allow the processor to communicate with remotely located I/O interface boards at a distance of up to 305 meters 1000 feet. Where operational features require two or more controllers to interact, hard wire the interaction, point for point. Optionally, data communication may be provided for controller to controller interaction provided operational considerations remain unchanged.

2.6.6 Interface

Standard printed circuit boards containing the necessary coding/decoding solid state circuits for communicating with the processor, method of setting board address as required in this section, LED indicators which display the status of each point and plug-in input/output modules.

2.6.7 Voltage

Provide controller that operates on 105 to 130 V ac, 60 Hz and contains an integral circuit breaker for overload protection. Controller must operate properly in environmental conditions of zero to 60 degrees C in up to 95 percent humidity (noncondensing). Controller must conform to electrical noise standards of IEEE C37.90.1 and NEMA ICS 1.

2.6.8 Speed

Provide controller speed such that no delay is noticed between the initiation of a control function such as operating a switch or opening a monitored door, and the resulting control action.

2.7 CONTROL POWER TRANSFORMER

Provide control power transformers to supply low voltage, 24 V ac power for locking control or signaling devices. Provide transformer with secondary, 24 V ac output with circuit breaker type overload interruption. Provide transformer rated for not less than 20 percent of load imposed on transformer of most severe loading condition. Provide power source for control power transformer from building emergency power system.

2.8 DC POWER SUPPLY

2.8.1 Low Voltage Power Supply Units

Provide low voltage dc power supply units to provide 24-volt regulated, filtered dc power for locking controls, dc locks and signal devices. Provide 24 V dc output power with ampere rating not less than 150 percent of load imposed on power supply under most severe conditions of load. The dc output must be fused. Regulate output voltage within plus or minus 5 percent from no load to full load. Power supply unit must be U.L. listed. Provide power source for dc power supply unit from panelboards that are fed from emergency generator.

2.8.2 Multiple Power Supplies

Where low voltage dc requirements for control devices operated at maximum load exceed output of a single power supply, provide multiple power supplies and subdivide loads to prevent overloading the power supply unit.

2.9 SECURITY EQUIPMENT CABINETS

2.9.1 Location

Provide cabinets where indicated to house auxiliary control system components such as power supplies, control power transformers, auxiliary relays, and amplifiers.

2.9.2 Construction

Provide surface mounted cabinets, constructed of code-gage steel, and finished on all surfaces with rust inhibiting prime coat and two coats of flat medium gray enamel paint. Provide hinged door and flush mounted lock and latch.

2.10 METAL CONTROL CABINETS

Provide cabinet to house locking control equipment. Furnish multiple cabinets assembled to form a single unit with space to accommodate equipment required to be installed therein.

2.10.1 Construction

Provide louvered cabinet sides, 16 gage sheet steel attached to 14 gage, 12.7 mm 1/2 inches wide angle frames from the inside with bolts. Provide cabinet front with hinged, lockable louvered doors, keyed alike. Provide cabinet rear panel of solid sheet steel unless the cabinet is mounted against a solid wall, in which case, a back is not required. Prime and paint trim, braces, angles, and exterior sides. Visual parts outside the cabinet will be beige. Provide cabinet with 305 mm 12 inch writing surface the same width as the cabinet mounted approximately 760 mm 30 inches above the floor.

2.10.2 Sloped Turrets

Provide the top part of the cabinets with sloped fonts. The approximate slope of the turret off the horizontal axis should be 0.523 rad 30 degrees. Provide cabinets 635 mm 25 inches front to back unless indicated otherwise, and a maximum overall height of 1065 mm 42 inches.

2.10.3 Cooling Fan

Provide a cooling fan located on the interior of the panel side with a capacity of 9.63 cubic meter 340 cubic feet per minute equipped with a integral charcoal filter. Position the fan intake as low as possible in the cabinet. The fan must be fused, operate at 120 volts, and operate continuously.

2.10.4 Groupings

Group conductors by systems and tie with nylon tie straps. Shape wire bundles for support from top and sides of structure. Do not attach support devices to removable panels.

2.10.5 Protection

Where groups of conductors or single conductor pass through metal framing or panels, protect conductors with rubber or plastic grommets.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Locking Control Panels

Install graphic locking control panels and linear locking control panels in metal control cabinets as specified. Coordinate installation of locking control panels in metal control cabinets with respect to dimensions, mounting and accessibility.

3.1.2 Security Equipment Cabinets

Install security equipment cabinets for locking control systems in the security equipment or electrical room closest to the associated locking control panel.

3.1.3 Junction Boxes

Provide junction boxes required for locking systems wiring in accordance with Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. Do not install junction boxes and pull boxes in areas accessible to prisoners.

3.1.4 Conduit Systems

Provide conduit systems required for locking systems wiring in accordance with Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

3.1.5 Wiring Systems

3.1.5.1 Wiring Specification

The work under this section includes the installation of wiring for the electrically operated locks, gates, and doors. The actual connections to individual locks, doors, and gates and the actual connections in the control panels and consoles is also included under this section. Coordinate this portion of the work with the detention hardware manufacturer.

3.1.5.2 Grouping

Group conductors within junction boxes, pull boxes, and equipment enclosures and lace with nylon tie straps with identification tabs, in individual sets servicing individual lock sets or operating mechanisms. Identify conductor groups on the strap with respect to room or operator served.

3.1.5.3 Continuous Runs

Do not splice locking system conductors. Conductors must be continuous between locksets and termination point for control panel.

3.1.5.4 Surge Protection

Protect communication and data equipment against surges induced on control, sensor, and data cables. Provide cables and conductors which serve as control, sensor or data conductors with surge protection circuits installed at each end that meets the IEEE C37.90.1 surge withstand capability test. Do not use fuses for surge protection.

3.1.5.5 Grounding

Provide grounding of wiring for locking control system in accordance with NFPA 70.

3.1.5.6 Wiring

Install wiring for locking control system in accordance with NFPA 70 and the approved locking control system wiring diagram.

3.2 PROTECTION OF EQUIPMENT

Due to the sensitivity of the locking control equipment to dust, dirt, condensing humidity, and other products normally found on construction sites, take precautions to ensure that the equipment is kept clean.

3.3 FIELD QUALITY CONTROL

Upon 7-days notice to the Contracting Officer, conduct the following tests in the presence of the Contracting Officer.

3.3.1 Locking Control System Test

Perform an operational system test to verify conformance of locking control system to this specification. Tests include the activation of all individual and group locking controls keep verification of operation, and verification of status annunciation of controlled devices.

3.3.2 Retesting

Rectify deficiencies indicated by test and completely retest work affected by such deficiencies.

3.4 TRAINING

Upon completion of the work and at a time designated by the Contracting Officer, furnish a competent technician regularly employed or authorized by the manufacturer of the locking control system to instruct Government personnel in the proper operation, troubleshooting, maintenance, safety, and emergency procedures of the locking control system. Provide a period of instruction of four eight-hour working days. Conduct the training at the job site. The Government has the option to record the training session.

3.5 EQUIPMENT SCHEDULES

The equipment schedules for locking control panels contained in this section of the specifications represent the type of control functions and status indication devices required in each locking control panel. Switches and LEDs must conform to the requirements for control devices and visual indicators as specified.

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NOTE: Panel schedule is a sample to be used as a guide by the writer for developing locking panel. Information on the schedules should be as follows: the name of locking control panel, type (graphic or linear), mounting (metal control cabinet), and location. Also list the function (e.g., press to test switch, silence switch, interlock bypass, interlock active, etc.) and quantity. These functions are individually described in this section. Under "REMARKS" include a brief description of the function. Finally, list the quantity and type of all security and builders hardware controlled or monitored by the locking control panel. Refer to architectural door schedule for type of door hardware.

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EQUIPMENT SCHEDULE		
Locking Control Panel:		Female Area
Type:		Graphic
Mounting:		Metal Cabinet
Location:		Female Control Area
		DEVICE REQUIREMENTS
Quantity	Remarks	Type or Function
1	Press to Test	Illuminates all LED's on panel.
1	Signal Silence	Silences all audible signals.
1	Interlock Bypass	Disables the interlock capability so that any number of doors may be open at one time.
5	Cell Call-in	
1	Shower Call-in	
3	Smoke Detector Indicators (Exhaust Duct Chase Mounted)	
1	Group Unlock	Unlocks all cell and shower doors
4	SH-7	Cell door hardware
1	SH-1	Cell door hardware
1	SH-16	Shower door hardware
1	SH-2	Sallyport dayroom door
1	SH-2	Sallyport door

-- End of Section --