**Section 22 11 19**

**LABORATORY SAFETY DEVICE SYSTEM**

PART 1 – GENERAL

1.1 SUMMARY:

1. Furnishings and installation of the Laboratory Safety Device System as shown on the Drawings as herein specified.

1.2 SCOPE OF WORK:

 A. Provide a laboratory safety device system for each Science Room as

 shown on the Drawings.

1. Each system shall include, but not be limited to, a utility controller panel, solenoid valves, electrical contactor, remote emergency shut off button, gas detector and all interconnections. The Plumbing Contractor shall provide all materials. Installation shall be in accordance with Part 3 of this section.

1.3 CODES AND REGULATIONS:

1. NFPA 70, National Electrical Code.
2. NFPA 72, National Fire Alarm Code.
3. NFPA 90A, Installation of Air conditioning and Ventilation Systems.
4. CSA C22.2 NO 61010-1.
5. Local and State Building Codes.
6. All requirements of the local Authority Having Jurisdiction.
7. UL61010-1 3rd Edition – Electrical Equipment for Measurement, control and Laboratory Use

1.4 WARRANTY:

1. Provide a manufacturer’s parts warranty covering 3 Years from date of completion.
2. Refer to Division 01 section “Warranties”

1.5 MANUFACTURER:

1. Canadian Gas Safety is the basis of design. Approved equals meeting all specifications and drawing requirements are acceptable.
2. Separate components may be provided in lieu of the specified manufactured system. Including but not limited to enclosures, remote shut off buttons, contactors and solenoid valves. The system shall include all piping, wiring, conduits, and final connections for a complete operational system.
	1. SUBMITTALS:
3. Comply with Division 01 Section “Submittals Procedures”
4. Product Data:
5. Manufacturer
6. Model Number
7. Catalog Data sheet with Photographs
8. Wiring and equipment connection diagrams clearly showing factory equipment and field installed equipment.
9. Provide all equipment, devices, conduit, operating power and other provisions for the Laboratory Safety System.
10. Shop Drawings
11. Include plans, elevations, sections and mounting and attachments details.
12. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
13. Wiring Diagrams
14. Detail wiring for signal, power and control wiring
15. Operation and Maintenance Data
16. Include in Emergency, Operation and Maintenance manuals.
17. Refer to Division 01 Section “Operation and Maintenance Data”
18. Manufacturer’s recommended detailed installation instructions.
19. Equipment is not to be ordered without approved submittals

PART 2 – PRODUCTS

2.1 PRODUCTS IN THIS SECTION:

1. All Products and Devices for a complete Laboratory Safety Device System with all components designed to operate together as a system. The system shall and be ULC listed and labelled and be as listed in the Equipment Schedule of the Section.

2.2 MERLIN UTILITY CONTROLLER:

At each science classroom and elsewhere as shown on Drawings, provide a Utility Controller with fascia panel mounted switches to activate remote solenoids and relays to control the natural gas services, domestic water and electrical convenience outlets or other indicated services or devices. Utility Controller shall be listed to Underwriter’s Laboratory UL61010-1 3rd Edition Standards. The controller shall be equipped with a clear LED status display, QR code and power indication LED. Fascia mounted emergency shut off button shall de-activate all utilities. The controller shall provide a pressure drop test function on the gas service to the classroom and only allow the flow of gas to the gas turrets once the test has been proven. A continuous pressure check on the gas supply pressure shall ensure protection from weak gas pressure. The controller shall provide an advisory relay output in alarm, inputs for remote emergency shut off buttons and gas detectors. Built in adjustable timeout function shall be available via dip switches within the controller. Re-set and control function via the key lock authority switch only. Provide Controller with Flush Mount Kit. Basis of design Canadian Gas Safety model 1000SW+.

2.3 PRESSURE TRANSDUCER:

Each Controller shall be provided with a ULC approved pressure transducer to be installed on the natural gas line, either via the solenoid valve or via a reducing fitting located as close to the solenoid valve as is permissible on the downstream side.

2.4 GAS SOLENOID VALVE:

Gas solenoid valves shall be ULC listed CSA Approved, aluminium body, NPT threaded.

Gas solenoids shall be 120v 50-60hz, Normally closed, Safety Shut off type with operating pressure of 0-5PSI. Gas valve shall provide operating indication LED. Plumbing contractor to coordinate installation of solenoid valve with electrical contractor. Number of solenoids, intended use and pipe sizes are as noted in Equipment Schedule or Drawings. Basis of design Canadian Gas Safety.

2.5 ELECTRICAL CONTACTORS:

Electrical contactors shall receive signal from utility control panel to govern the electrical power going to the classroom receptacles. Associated circuits shall be ran from the electrical panel, through the contactor to the receptacles. Contactor shall be rated for 20amp service and provide 4poles in a normally open configuration capable of receiving a 110v 3amp signal. Number of contactors, location, circuit numbers are as noted on the electrical panel schedule or drawings. Basis of design Siemens 3RT23171AK60 or equivalent.

2.6 CONTACTOR ENCLOSURE:

Electrical contactors shall receive signal from utility control panel to govern the electrical power going to the classroom receptacles. Associated circuits shall be ran from the electrical panel, through the contactor to the receptacles. Contactor shall be rated for 20amp service and provide 4poles in a normally open configuration capable of receiving a 110v 3amp signal. Number of contactors, location, circuit numbers are as noted on the electrical panel schedule or drawings. Basis of design Siemens 3RT23171AK60 or equivalent.

2.7 WATER SOLENOID VALVE:

Water solenoid valves shall be NSF apprd. Brass lead free, EPDM seal, 8W 120v 50-60HZ, Normally closed type with an operating pressure of 2-230PSI. Number of solenoids, intended use and pipe sizes are as noted in Equipment Schedule or Drawings. Basis of design Canadian Gas Safety.

2.8 REMOTE PANIC BUTTON:

Where shown on Drawings and where classroom size and configuration restricts clear path from work areas to Utility Controller, provide a wall mounted Remote Panic Button. Assembly shall be located as shown on Drawings and as stipulated in Equipment Schedule. Integrate assembly with low voltage input on Controller.

2.9 FUEL GAS SENSOR:

Where shown on Drawings and in Equipment Schedule, furnish and install an CGS Merlin NG Gas Sensor in order to detect gas within the classroom. Detector to provide clear digital reading of %LEL value. Integrate Fuel Gas Sensor with the Controller with 4# 18-22AWG shielded cable.

2.10 FAN CONTROL

 Where shown on Drawings and in Equipment Schedule furnish and install a Manual Fan

Control and Purge Fan activation panel. Panel to automatically run the fan when the Merlin utility controller is turned on or in alarm function with built in adjustable time parameters. Panel works with on / off fan assembly and two speed fans. Install as per drawings. Basis of design Canadian Gas Safety Merlin FS1. Flush mount kit available CGSFMK500.

PART 3 – INTERGRATION AND CONFIGERATION

* 1. Building Automation or Management Systems (BMS):
1. Where shown on Drawings, provide low voltage integration wiring from each Controller to connection point on BMS. Merlin Controller provides a NO, COM and NC relay output for BAS / BMS integration, the relay will change state in “Alarm” or “Gas On”. The Merlin Controller can accept low voltage signal from Fire Alarm to shut down utilities in case of fire alarm. Final connection by others.
	1. Exhaust Fan:
2. Where shown on Drawings, provide low voltage integration wiring from each Controller to connection point on Manual Fan Control Panel.

 B. Power to exhaust fan runs through Manual Fan Control Panel. Panel provides manual on / off

 control and timed purge in alarm. Purge options include: on in alarm, adjustable timed delay.

C. Where shown on Drawings, provide a Manual Fan Control Panel to run the fan each time the
 CGS Merlin controller key switch is turned to the ‘ON’ position.

* 1. SYSTEM CONFIGURATION:
1. Utility Controllers shall be factory configured to the standard configurations and shall be capable of field adjustments to meet specific project modification requirements. Configurations are limited to DIP switch adjustments on rear of fascia panel without the requirement of additional equipment.
2. Classroom Utilities:

Each Gas service with outlets at student work-stations shall be controlled by output circuit at the Utility Controller. Control of services can be combined onto one output circuit as indicated on Drawings. Services shall be activated by Controller authority control key and fascia panel master control switch. Activation and deactivation of Gas service shall be restricted to the instructor by means of the authority key lock switch. Key is required to re-set panel after an alarm condition.

1. Time-Out Function:

Each Controller be pre-set to shut down after either 2hrs, 4hrs 8hrs or have this function disabled. This configuration shall be adjusted via the DIP switches on the reverse side of the fascia panel.

1. Panic Alarm Re-Set:

Unless stated elsewhere on Drawings, The Controller shall only re-set from panic alarm after engagement of the authority key on fascia panel and after local panic alarm has been re-set.

1. Fire Alarm Re-set:

Unless stated elsewhere on Drawings, the Utility Controller shall be configured so that continued fire alarm signal to Controller shall prevent re-set.

1. Purge-Exhaust Fan:

Where indicated by the Drawings, classrooms having an exhaust fan shall have fan configured with Utility Controller so that the fan will automatically purge classroom in case of emergency. Fan shall be integrated with Controller via the FS1 output. Provide control wiring from Controller contacts to FS1 and configure the Controller via the DIP switches on the reverse side of the fascia panel. See manufacturer’s installation instructions for switch options.

1. Exhaust Fan Activation During Gas Usage:

Where indicated by the Drawings, classrooms using gas shall run the fan each time the Utility Controller key switch is turned to the ‘ON’ position. FS1 controller shall be integrated with Utility Controller. Provide control wiring from Controller contacts to FS1 and configure the Controller via the DIP switches on the reverse side of the fascia panel. See manufacturer’s installation instructions for switch options.

1. EPO’s and Panic Buttons:

Each Controller shall be configured so that pressing remote EPO or Panic Buttons will disable all utilities. If required; Water and Electrical utilities can be configured to stay on in an emergency. Each Controller shall be configured so that Gas services will automatically shut down in all alarm modes.

1. Fuel Gas Sensor:

Where shown in Drawings, unit shall integrate with Controller and shut down all designated outputs. Each Controller can utilize up to three fuel gas sensors.

PART 4 – EXECUTION

4.1 INSTALLATION:

1. Install in accordance with manufacturer’s recommendations and instructions. Verify manufacturer’s mounting heights to comply with local codes & standards.
2. Finish and install all devices as shown in Drawings and as specified herein. Where device is to be installed by other trades, furnish and then turn over to appropriate trade for installation.
3. Furnish, install and make final connections to monitoring and remote EPO’s and Panic Buttons as indicated on Drawings and specified herein. Furnish and install low voltage and volt free control wiring from Utility Controller to connection point on BMS and Exhaust Fan controller. Final connection by others.

4.2 PLUMBING:

1. Make final connections to all piping systems where indicated by Drawings and specifications. Install in accordance with SECTION 221000.

4.3 ELECTRICAL:

1. Electrical Contractor shall furnish all conduit and wiring, making final wiring connections to all equipment as indicated by Drawings and specifications. Contractor shall be responsible for all system configurations, integration, test and start-up.

PART 5 – SYSTEM TEST AND START-UP

1. Prior to placing the Utility Controller System into service, perform ALL Start-Up procedures and checklists as stated in Manufacturer’s Operations and Maintenance Procedure
2. Verify that all components and devices comply with manufacturer’s requirements and recommendations and that all devices and installations conform to Drawings and specification requirements.
3. Upon completion of ALL Start-Up tests, place the system into service. Complete all warranty registration documents. Submit originals with other project related closeout and O & M documentation. Review all operating procedures with a representative of the owner. Provide all System Authority Keys to the owner’s representative.

PART 6 – EQUIPMENT SCHEDULE

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| --- | --- | --- | --- |
| Product | Model | Description  | Remarks |
| Gas, Electric & Water Utility Control | Merlin1000SW+ | c/w Pressure Transducer  | Tri Output Controller |
| Flush Mount Kit | CGSFMK | 1000SW+ Kit c/w trim |  |
| Remote EPO  | CGSEPOTW | Twist Release Clear Cover “Emergency Power Shut-Off”  | Mushroom Type |
| Fan Control Panel | CGS FS1 | Manual and Purge  |  |
| Flush Mount Kit | CGSFMK500 | 500/FS1/GDP c/w trim |  |
| Gas Solenoid Valve | CGS Merlin\*\*\*\* | ” 0-2PSI 120V NC  | Safety Shut Off Valve |
| Water Solenoid Valve | CGS SOLVLV\*\* | ” 2-230PSI 120V NC | Safety Shut Off Valve |

\* All sensors should be mounted for the desired gas requirements. Consult manufacturer for recommendations and requirements.