**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. Americans with Disabilities Act.
5. Uniform Building Codes (UBC).
6. Local and State Building Codes.
7. All requirements of the local Authority Having Jurisdiction.
8. 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. American Gas Safety 727.608.4375 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:

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 UL listed

and labelled and be as listed in the Equipment Schedule of this 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 natural gas, domestic water and electrical convenience outlets or other indicated services or devices. Utility Controller shall be certified to Underwriter’s Laboratory UL61010-1 3rd Edition Standards. Controller shall utilize and operate a pressure transducer to perform a pressure drop test on the natural gas line before allowing gas to be supplied. Controller shall continuously check incoming gas supply pressure throughout operation. Controller shall provide line voltage signals for output circuits. Controller shall provide inputs for remote EPO’s and Gas Sensors. The Controller shall be equipped with an Authority Key Lock that restricts activation and de-activation of output signals to the instructor or educator. Controller shall be provided with a fascia mounted recessed EPO button. Basis of design AGS Merlin 1000SW+

2.4 PRESSURE TRANSDUCER:

Each Controller shall be provided with a UL approved pressure transducer to be installed on the natural gas pipe, either via the solenoid valve or via a reducing fitting located as close to the solenoid valve as is permissible on the downstream side. Transducer shall be 12vdc powered by the utility control and shall provide a 0-12vdc return signal.

2.5 GAS SOLENOID VALVE:

At each science classroom and where shown on Drawings, Provide a Gas Solenoid Valve: UL Listed 429, CSA Certified, FM 400 liquid or gas safety shut-off valve. Aluminium body two-way normally closed valve rated for natural gas (methane) and LPG (liquid petroleum gas). Size to be same as pipe size indicated on plans, 120 volt ac single phase actuator, 15 watts, and 5 PSI maximum operating pressure capacity. Manufacturer: American Gas Safety (AGS) series AGSGSV\*\*\*\* or equivalent

2.6 WATER SOLENOID VALVES:

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 AGS SOLVLV\*\*

2.7 ELECTRICAL CONTACTOR:

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 AGS CON4P20ANO or equivalent.

2.8 CONTACTOR ENCLOSURE:

Enclose contactors in a 16guage mild steel type 1 junction box. Ensure junction box is adequate size to accommodate required number of contactors. Locate enclosure above classroom ceiling close to doorway. Basis of design AGS CONENC10106

2.9 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. Button shall be red mushroom twist re-set type recessed in a yellow polycarbonate enclosure with a clear lift up protective shield. Button shall be UL listed and provide clear label text “Emergency Power Off”. Assembly shall be located as shown on Drawings and as stipulated in Equipment Schedule. Integrate assembly with volt free dry contact input on Controller. Basis of design AGS EPOTW

2.10 FUEL GAS SENSOR:

Where shown on Drawings and in Equipment Schedule, furnish and install a NG (Methane) Gas Sensor to detect natural gas within the classroom. Detector to provide clear digital traffic light reading of %LEL value. Detector shall provide a local visual and audible alarm. Integrate Fuel Gas Sensor with low voltage input on Controller. Sensor quantity and location as per drawings and manufacturer’s instructions. Basis of design AGS NGiS.

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 shutdown utilities in case of fire alarm. Final connection by others. See manufactures instructions.
	1. Exhaust Fan:
2. Where shown on Drawings, provide low voltage integration wiring from each Controller to connection point on Exhaust Fan controller. Alternatively utilize permanent 12vdc output and BMS output to connect to a 12vdc relay to interrupt manual control of the exhaust fans. Final connection by others.
	1. SYSTEM CONFIGURATION:
3. 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.
4. Classroom Utilities:

Each utility service with outlets at student work-stations shall be controlled by independent 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 fascia panel master control switches and the engaging of the authority control key. Activation of utility services shall be restricted to the instructor by means of the authority key lock switch.

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 BMS output. Provide control wiring from Controller contacts to BMS 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 ADA or other 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 221116

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 |
| Controller | 1000SW+ | Gas Water Electric | c/w pressure proving |
| Flush Mount Kit | AGSFMK | Rough in Box |  |
| Gas Valve | AGSGSV\*\*\*\* | 0-5PSI 110V NC NPT | Size Dependant |
| Water Valve | SOLVLV\*\* | 3.230PSI 110V NC NPT | HW, CW, HWR  |
| Electrical Contactor | CON4P20ANO | 4pole 20amp NO  | Number per drawings |
| Contactor Enclosure | ENCCON10104 | Metal Junction Box | Quarter turn latch  |
| Panic Button | AGSEPOTW | Twit Release Clear Cover | Mount on single gang rough in box  |
| Gas Detector | AGSNGTFT | Methane Detector | 1 per room  |
| Pressure Transducer | AGSPT | ¼”NPT 0-100mb | c/w 1000SW+ |
| Fan Control | AGSFS1 | Manual Fan Control With Purge In Emergency | See plans |

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