WORKING ON EQUIPMENT WITH FIRE SUPPRESSION SYSTEMS

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The following is a step-by-step procedure on how to complete a specific task or meet a facility specific requirement. Standard Operating Procedures (SOPs) are written for all identified critical tasks. By virtue of the hazard or complexity associated with critical tasks it is paramount that the SOP be followed as written. SOPs contain a listing of high-level hazards associated with the task, for detailed hazard analysis reference the applicable Task Hazard Assessments. SOPs do not replace the requirements contained in the company Standards, Codes, and Processes nor does it replace the need to comply with required legislation. Section 8.0 references documentation that the worker shall understand before work commences.

1.0 PURPOSE

- To establish a company standard to safely and effectively carry out work as it applies to working on equipment with fire suppression systems.

2.0 SCOPE AND APPLICATION

- This document applies to all company Heavy Construction Mining operations. Ensure all site specific requirements are being met or exceeded before performing the task.

3.0 HAZARDS AND CONTROLS

- Discharge of fire suppression system while working on equipment. This can cause additional downtime of equipment, damage equipment components/parts, and/or result in potential adverse health effects due to the inhalation of dry chemical.
    - Only competent technicians designated by their supervisor can disarm or rearm a fire suppression system.
    - Ensure fire suppression system has been properly deactivated for the task being performed and the type of equipment being worked on (i.e., system has been placed in bypass or system has been fully disarmed).
    - Protect components while doing maintenance (example: fire blankets,).
- Discharge of fire suppression system during or after pressure washing and/or steaming of equipment.
    - When steaming or pressure washing equipment, avoid fire suppression boxes and switches so that water cannot penetrate the wiring. Water can cause a short in the system when the system is placed back in active mode.
    - Always use a fan tip when around engine components, fire suppression systems, and fire suppression bottles. Do not spray directly at wires or connectors.
- Equipment returning to work without fire suppression system in active mode.
    - Ensure fire suppression systems are set in active mode after being placed in bypass prior to releasing the unit from maintenance.

- Ensure fire suppression systems are rearmed and connected if disconnecting the bottles prior to releasing the unit from maintenance.
- Confirm system is active mode prior to releasing to work.

- Discharge of fire suppression system after reactivation.
  - Inspect the system prior to rearming. If the trouble light flashes or goes into alarm after placing the system into active mode or rearming, pull the fuse, tag out the system/lockout the unit and notify the supervision for follow up.

4.0 CHECKLIST

- ☐ Attend all preparatory meetings (IE: daily PSI; job scope; review of JSA's and SOP's for the job)
- ☐ Complete FLRA cards before starting the work.
- ☐ Ensure all personnel involved in the task are aware of the hazards and the controls to be used, as identified in the SOP's; JSA's; and FLRA's.
- ☐ Conduct a pre-job inspection of all equipment to be worked on and tools to be used.
- ☐ **Standard of Training required for working on this job: On-the job training.**

5.0 DEFINITIONS

5.1 Company

Means North American Construction Group Ltd. (NACG) and all directly or indirectly owned subsidiary companies, including joint ventures.

5.2 Company Personnel

Includes the Company's employees, officers, directors, agents, associates, consultants/contractors, temporary employees and third-party processors.

5.3 HSE

Refers to the Health, Safety & Environment department.

5.4 PAD

Protracting actuating device.

5.5 Fire Suppression Maintenance Bypass Switch

The Fire Suppression Maintenance Bypass switch provides a secure method for a non-factory trained technician to lock out the system and to prevent an automatic system discharge during routine vehicle maintenance. It shunts the releasing loop to avoid static discharge. This mechanically interrupts all connected releasing circuits and shunts the downstream activation devices.

When the switch is set to "Bypass" the Fire Suppression panel will illuminate the yellow trouble light and a strobe light will activate (if equipped with strobe light). When the switch is set to "Active" the Fire Suppression panel will illuminate the green "System OK" light and the strobe light will deactivate (if equipped with strobe light). The unit's fire suppression system is now active. Note: When the fire suppression system is in bypass the system continues to be live therefore it can still be activated by the Pull Station.

On the Amerex system the control panel will go into alarm when placed in bypass. Prior to returning the fire suppression system to active, review the control panel messages to determine if there are any faults. Contact a qualified Fire Suppression Technician if the control panel indicates an error message.

6.0 PROCEDURE

1) Supervisor and workers will discuss the task and plan the safest way to approach the work.

2) Workers will complete a hazard assessment (i.e. FLRA card) and identify the hazards and controls. Any other workers involved in the task must review and sign onto each other's FLRA cards.

3) Before working on equipment with fire suppression systems, know and understand the type of system you will be working on (Kidde, Ansul and Amerex).

4) Isolate all forms of hazardous energy and ensure the equipment is adequately locked out. Follow Hazardous Energy Isolation Code 950C-C-028.

5) Follow the manufacturer's procedures when working on equipment with a fire suppression system.

6) Evaluate the scope of work being completed on the equipment and determine if the unit's fire suppression system should be active or inactive. If the scope of work requires the system to be inactive, further evaluate if the system should be placed in bypass or be disarmed (see the chart below for different examples of job tasks). Always disarm fire suppression systems before working near the wires and connectors.

EXAMPLES OF JOB/TASK	FIRE SUPPRESSION SYSTEM STATUS
Fuel, service, lube, filter change	Active
Transportation on public road	Disarm
Running maintenance (i.e., changing equipment lights, troubleshooting)	Active or bypass
Steaming/washing	Bypass or disarm depending on equipment type (haul trucks and shovels are usually disarmed; graders, dozers and excavators are usually placed in bypass)
Hot work/welding	Bypass or disarm depending on the location of work. If work is near the IR sensors, wires or connectors, disarm the system.
Mechanical PM or non-running/routine maintenance (i.e., component change out).	Bypass or disarm depending on location of work or if work is near wires or connectors.

NOTE: If the system must be disarmed, a tag and/or sign indicating the fire suppression system is disarmed / deactivated must be installed in the cab (steering wheel or ignition source) and on the bumper (magnetic sign or a tag at the lower control box). Once the task is complete the system must be activated, and the tag and/or sign can be removed.

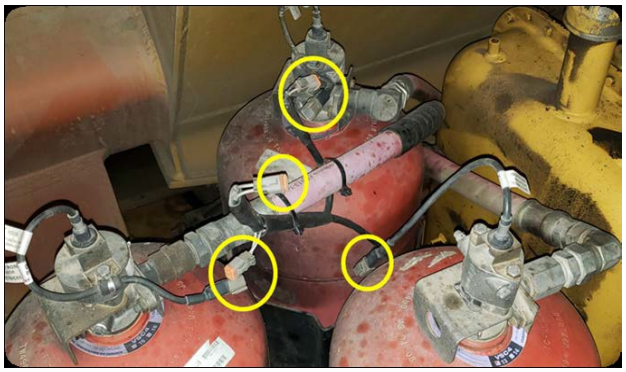
6.1 Kidde System

6.1.1 Disarming the Kidde Fire Suppression System

1) Check the status of the panel for a solid green light.

2) Disconnect all metrons on agent cylinders.

3) Check the status of the panel for a yellow/orange trouble light and tag out the machine.



NOTE: Double check all metrons are disconnected! when metrons are unplugged, there is **no fire suppression** available.

6.1.2 Rearming Kidde Fire Suppression Automatic Detection

1) Verify the panel status is yellow/orange (trouble light).

2) Recheck that status on the panel is yellow/orange only. If panel shows any other condition - (example alarm) shut down the unit and contact supervisor.

3) Reconnect all metrons.

4) Check the status of the panel for a solid green light if any other condition exists contact the supervisor.

5) Remove lock out tag.

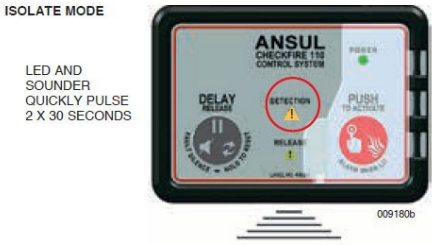
6.2 Ansul Check Fire 110

6.2.1 Ansul Check Fire 110 Isolation Feature – De-activation Mode

1) Press and hold the "Delay/Rest/Silence button for approximately 8 seconds causing two consecutive resets: control module cycles through two SDR and LED tests.

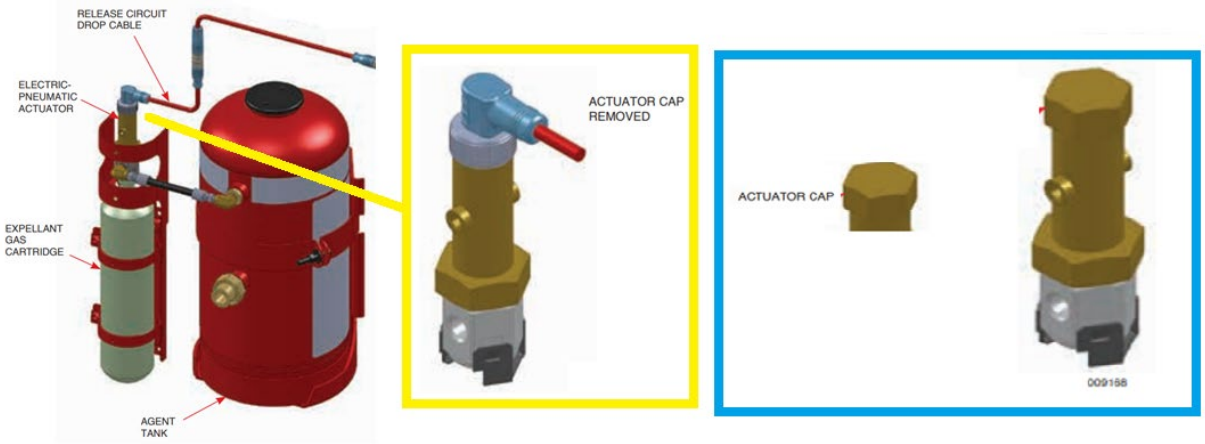
2) Amber Detection Fault LED and sounder quickly pulse 2 x 30 seconds indicating Isolation Mode.

3) If desired, push the "Delay/Reset/Silence" button to silence sounder.



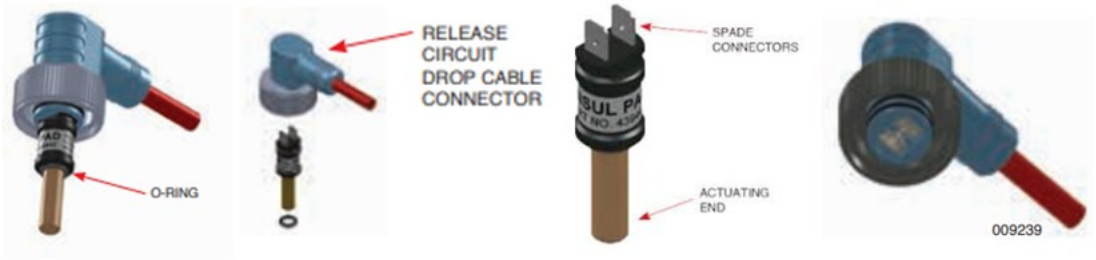
6.2.2 Ansul Check Fire 110 Isolation Feature – Disarming Complete System

1) Ensure you have actuator cap(s) to block PAD port(s) opening once removed.



2) Unscrew the release circuit drop connector cap with fingers, quickly installing cap to keep out contaminants.

3) Once disconnected from the actuator; carefully pull and disconnect the PAD's 2 spade connector from the drop cable cap.



4) Place the PAD into manufacturer's small, padded bag to prevent damage. Ensure no electrical contact across PAD spade connectors.

5) Cap off the drop cable cap.

Note: when handling the PAD, always point the actuating end away from yourself and others. On electrical initiation, PAD operates very quickly, and the small brass disk forcefully separates from the actuating end. Physical injury may occur from the contact with the actuating pin and/or the detaching disk.

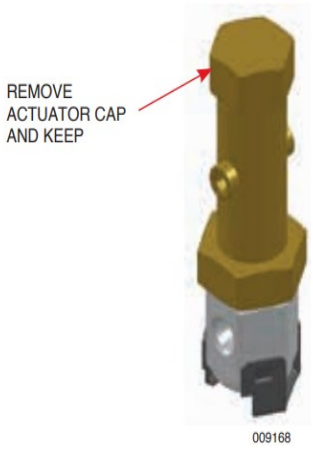
6.2.3 Ansul Check Fire 110 Isolation - Rearming System

1) Remove actuator cap on top of the Electric-Pneumatic Actuator and retain for future use.

2) Carefully inspect the PAD, noting installation date, legible, and not expired (5-year in-service) from date of install.

3) Prior to install carefully inspect the PAD for actuation.

   a. If the pin is exposed out from the actuation end or if the pin has retracted back into PAD, check the tip. If the pin is visible PAD has actuated! **Do Not Install**, get new PAD.



4) Install PAD into Release Circuit Drop Cable and verify O-ring, is in place on PAD.

5) Install all PADs in the Release Circuit Drop Cable(s) then confirm all faults are cleared prior to installing Release Circuit Drop Cable(s) into Actuator(s).

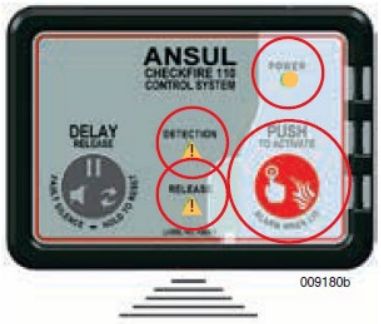
PAD FIELD INSTALLED IN CABLE

6) Attach Release Circuit Drop Cable to Electric-Pneumatic Actuator, hand-tighten connector. (Keep actuator cap for recharge and maintenance procedures.)

7) Be sure the control module does not have any faults or alarms before installing Release Circuit Drop Cable to Electric-Pneumatic Actuator.

MULTIPLE CIRCUIT FAULTS

ALL LEDS
PULSING
1 X 10 SECONDS



8) If needed, complete installation of the pneumatic manual actuator(s). Re-install pneumatic manual actuator cartridge(s) if previously removed.

   a. **NOTE:** Prior to returning the equipment to operations, ensure the bypass switch is set to active and the green “System OK” light is illuminated on the panel.

   b. If an alarm condition has occurred in the Isolate Mode, resetting the control module results in an immediate start of the time delay leading to a release of suppression system.

6.3 Ansul Check Fire 210 Fire Suppression System

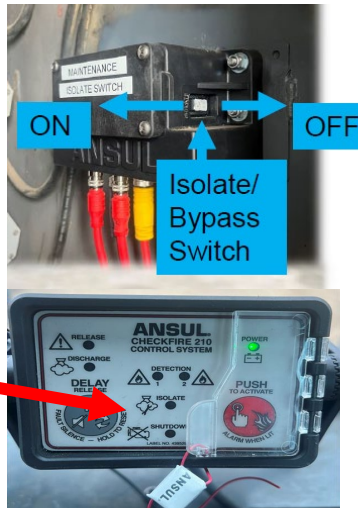
6.3.1 Ansul Check Fire 210 Fire Suppression System – Bypass/Isolate Mode

1) View the panel for 45 seconds to ensure there are no other lights flashing and only the GREEN power light is on. Proceed to the ICM (Interface Control Module) located in the electrical room.

2) Push the isolate button forward towards the front of the panel to put the system in **Bypass/Isolate** Mode.

3) You will hear two beeps every 45 seconds this is normal.

4) Return to the control system panel and you should see an amber flashing light indicating system is in Bypass/Isolate mode.



NOTE: If the system is in Bypass/Isolate mode it can only be deployed from the system control panel in the cab and pneumatic manual actuators.

If a fault or alarm condition occurrs in Isolation Mode the condition will be displayed, and the module will remain in Isolate Mode. If an alarm condition has occurred in the Bypass/Isolate Mode DO NOT return the system to NORMAL (OFF) until cause of detection is found and cleared, notify supervision. Switching the Bypass/isolate switch to the normal (OFF) position during an alarm condition results in immediate start of the Time Delay sequences leading to system release.

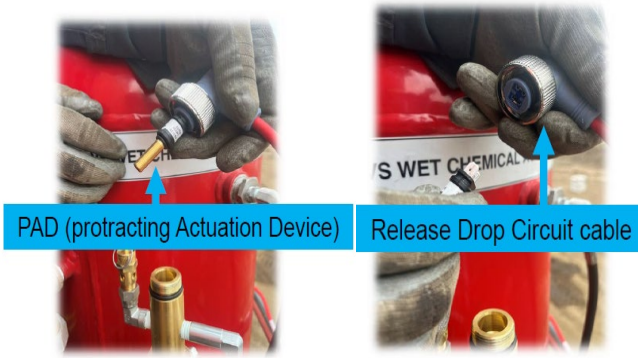
6.3.2 Ansul Check Fire 210 Fire Suppression System – Disarming the System

1) Remove the cap and expose the PAD (Protracting Actuation Device).

2) Unplug the Release Drop Circuit cable (you will hear another beep this is normal).

3) Store the PAD in a dry and safe area until ready to return the system to active mode.

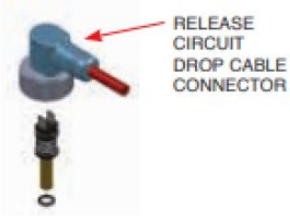
    a. **NOTE:** Removing the release drop circuit prevents any accidental discharge of the system.

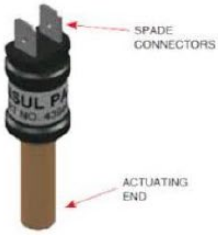


4) Once disconnected from the Actuator; carefully pull and disconnect the PAD's 2 spade connector from the Drop Cable Cap.

5) Place the PAD into manufacturer's small, padded bag to prevent damage and into a storage container. Ensure no electrical contact across PAD Spade Connectors.

6) Cap off the Drop Cable Cap.





NOTE: When handling the PAD, always point the actuating end away from yourself and others. On electrical initiation, PAD operates very quickly, and the small brass disk forcefully separates from the actuating end. Physical injury may occur from the contact with the actuating pin and/or the detaching disk.

6.3.3 Ansul Check Fire 210 Fire Suppression System – Rearming System

1. Carefully inspect the PAD, noting installation date, legible, and not expired (5-year in-service) from date of install.

2. Prior to install, carefully inspect the pad for actuation.

   a. If the pin is exposed out from the actuation end or if the pin has retracted back into PAD, check the tip. If the pin is visible PAD has actuated! **Do Not Install**, get new PAD.

3. Install PAD into release circuit drop cable and verify O-ring, is in place on PAD.

4. Install all PADs in the release circuit drop cable(s) then confirm all faults are cleared prior to installing release circuit drop Cable(s) into Actuator(s).

PAD FIELD INSTALLED IN CABLE

7.0 NOTES

If this task is to be done by a method different than described in this SOP, the work must **STOP** and the alternate method must be **DOCUMENTED** with an adequate hazard assessment tool such as a JSA. The document must be **APPROVED** by a supervisor before such procedures are implemented.

8.0 REFERENCES

- 950C-C-019 Fire Suppression Code
- 950C-C-022 General Housekeeping Code
- 950C-C-025 Hand Tools Code
- 950C-C-028 Hazardous Energy Isolation Code
- Kidde Fire Systems Maintenance Bypass Switch P/N 83-132483-500
- Ansul Check Fire – 110 Manual

9.0 APPENDICES

- Appendix A - Ansul Fire Suppression System – Components
- Appendix B - Ansul Check Fire 210 Control System Panel
- Appendix C - Ansul IR Flame Detector Cameras & Ansul Discharge Pressure Switch

Appendix A Ansul Fire Suppression System - Components

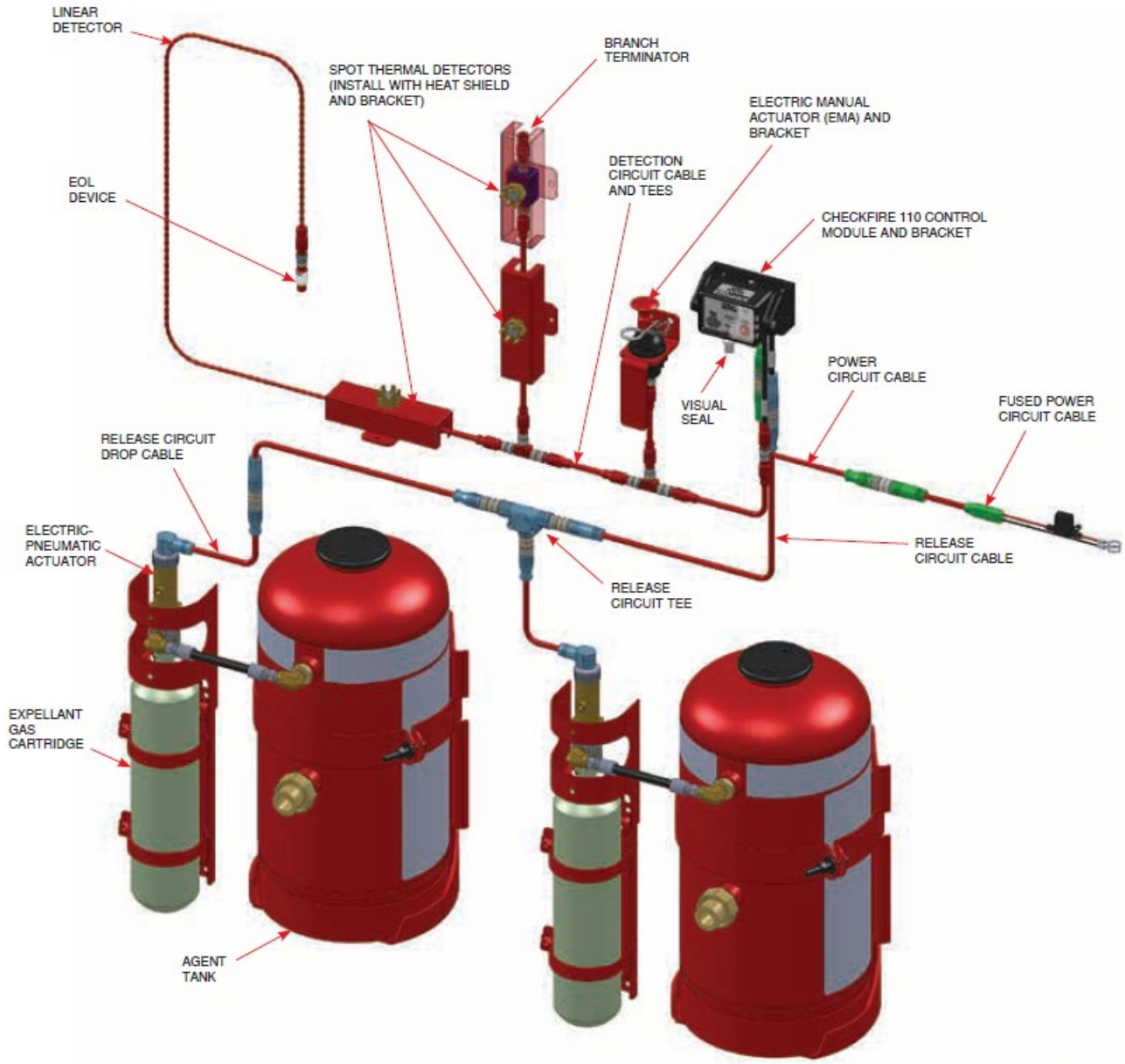


FIGURE 1-2
SYSTEM CONNECTIONS

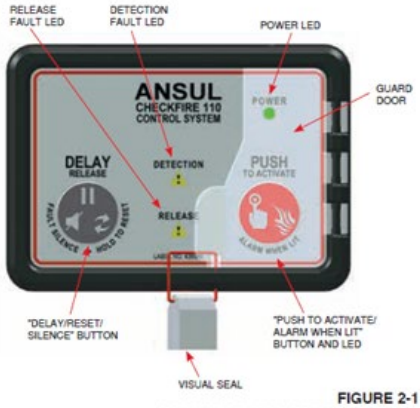


FIGURE 2-1
CHECKFIRE 110 CONTROL MODULE

FIGURE 2-4
ELECTRIC MANUAL ACTUATOR (EMA)

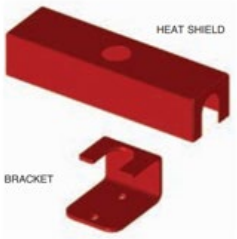


FIGURE 2-7
DETECTOR BRACKET AND HEAT SHIELD

FIGURE 2-21
PAD FIELD INSTALLED IN RELEASE CIRCUIT DROP CABLE

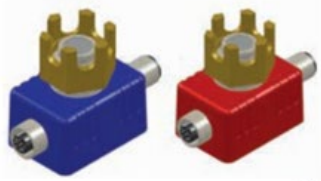


FIGURE 2-6
SPOT THERMAL DETECTORS

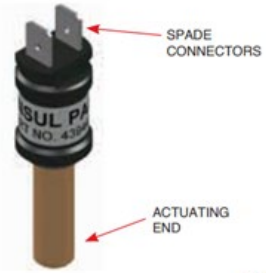


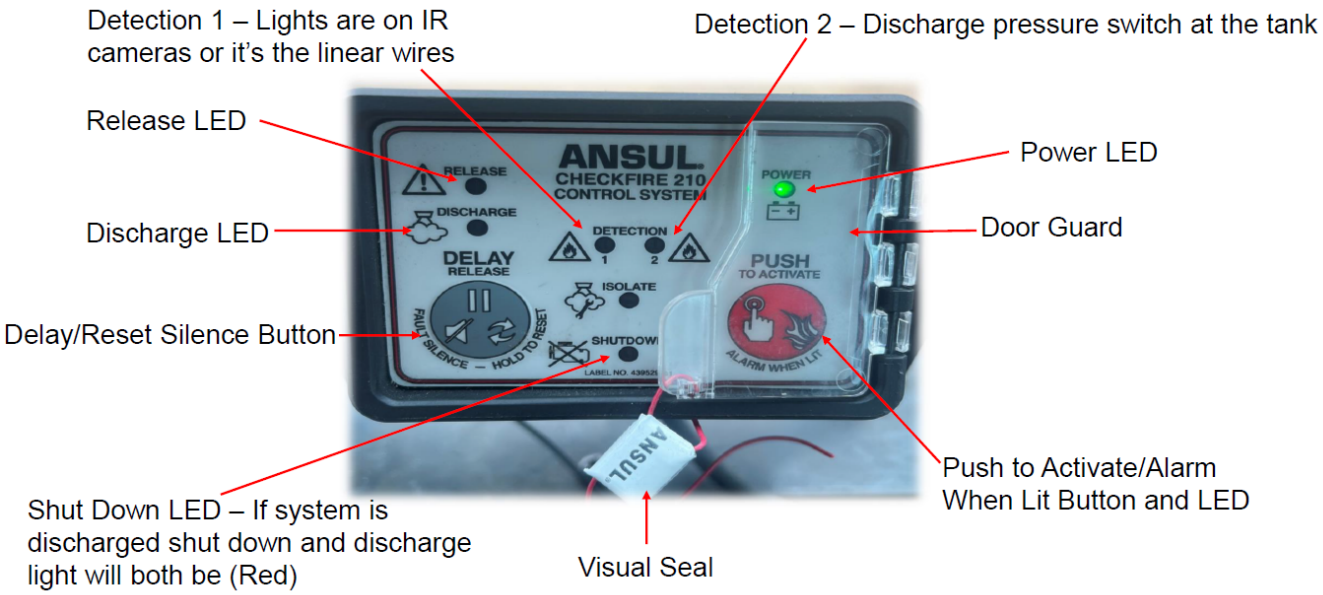
FIGURE 2-20
PAD

FIGURE 2-8
LINEAR DETECTOR

FIGURE 2-19
ELECTRIC-PNEUMATIC ACTUATOR

FIGURE 2-22
ELECTRICAL ACTUATION FOR ELECTRIC-PNEUMATIC ACTUATOR

Appendix B Ansul Check Fire 210 Control System Panel


Detection 1 – Lights are on IR cameras or it's the linear wires
Detection 2 – Discharge pressure switch at the tank
Release LED
Power LED
Discharge LED
Door Guard
Delay/Reset Silence Button
Push to Activate/Alarm When Lit Button and LED
Shut Down LED – If system is discharged shut down and discharge light will both be (Red)
Visual Seal
ANSUL
CHECKFIRE 210
CONTROL SYSTEM
RELEASE
DISCHARGE
DELAY
RELEASE
DETECTION
1
2
ISOLATE
POWER
PUSH
TO ACTIVATE
ALARM WHEN LIT
FAULT SILENCE – HOLD TO RESET

Appendix C Ansul IR Flame Detector Cameras & Ansul Discharge Pressure Switch

Ansul IR Flame Detector Cameras

The cameras must see a flame for 20 seconds then a signal is sent to the panel and automatically activates the fire suppression system.

The linear wires are two strand and if they are crushed or were to heat up to 356 degrees Celsius, they bond together and activate the fire suppression system.

Ansul Discharge Pressure Switch

If the system is discharged the Discharge Pressure Switch at the tank will require to be reset.

This should be done by Levitt when the system will be recharged.

NOTE: There are 4 ways the system is activated.

1.Pneumatic Cartridge

2.Red activation Button on The Panel

3.IR Flame Detector Cameras

4.Linear Wire