Key Technology, Inc.

Confined Space Entry Program

July, 2017

Key Technology, Inc.
CONFINED SPACE ENTRY PROGRAM

OVERVIEW
Purpose:

The purpose of this program is to ensure the protection of all employees of Key Technology, Inc. from the hazards associated with confined space entry. This document contains requirements for practices and procedures to protect employees from those hazards of entry into and work within permit required confined spaces.

Definition of a Confined Space:

A confined space means a space that: **1)** is large enough and so configured that an employee could fully enter and perform assigned work; **2)** has limited or restricted means for entry or exit; and **3)** is not designed for human occupancy.

A permit-required confined space means a confined space that either **1)** contains or has the potential to contain a hazardous atmosphere, **2)** contains a material that has the potential for engulfing an entrant, **3)** has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section, or **4)** contains any other serious safety or health hazard.

These hazards may include any or all of the following:

- Engulfment and/or entrapment
- Hazard atmospheres
- Other serious safety or health hazards

Hazard atmospheres are defined as an atmosphere that may expose an entrant to the risk of death, incapacitation, impairment of ability to self-rescue, injury or acute illness from one or more of the following causes:

- Atmospheric oxygen concentrations less than 19.5 percent or greater than 23.5 percent
- Flammable gas, vapor or mist at a concentration in excess of 10 percent of the lower flammable limit (LFL)
- Airborne combustible dust at a concentration that meets or exceeds its LFL
- Atmospheric concentration of a toxic substance that exceeds its dose or permissible exposure limit (PEL)
- Any other atmospheric concentration that is immediately dangerous to life and health

A non-permit-required confined space means a confined space does not have the potential for containing atmospheric conditions capable of causing injury or death.

General Procedures

- Based on these definitions, management is responsible for determining which areas are considered confined spaces and which confined spaces are permit-required confined spaces.
- Before employees enter a permit-required confined space, management is responsible for identifying and evaluating the hazards of the permit spaces.
- Immediately after identifying the permit-required confined spaces, signs reading "DANGER—PERMIT-REQUIRED CONFINED SPACE. DO NOT ENTER," or similar, must be placed at each entrance of the confined space.

- Verifying that conditions in the permit space are acceptable for entry throughout the duration of an authorized entry.
- Before allowing entry into any permit-required confined space, the following steps must be followed:
  - Specify acceptable entry conditions
  - An atmospheric test should be performed in the confined space to ensure the required ambient conditions—less than 10 percent LFL, greater than 19.5 percent and less than 23.5 percent oxygen, and less than the PEL of a contaminant—exist.
  - Ventilation systems must be used as required
  - Purge, inert, flush, or ventilate the permit space as necessary to eliminate or control atmospheric hazards
  - The space should be free of other hazards by locking and tagging out equipment as necessary.
  - The permit space must be isolated.
  - Provide pedestrian, vehicle, or other barriers as necessary to protect entrants from external hazards.
  - External rescue services need to be identified or the company rescue group notified.
  - The permit has to be completely filled out, reviewed by entrants of the potential hazards and posted near the permit-required confined space's entrance.
  - Only authorized entrants are allowed entry into a permit-required confined space.
  - Authorized employees, attendant(s) and entry supervisor(s) should be properly trained regarding all issues in the training section.
  - Communications must be in place and operable to summons rescue in case of emergency.

General Training

Each employee at Key Technology who is involved or has the potential to be involved in confined-space entries must be trained before entering any space, as well as:

- Before first assigned duty in a confined space
- Whenever there is a change in the employee's duties or assignment
- Whenever a new hazard has been created or confined spaces have changed
- Whenever it is determined that there have been or must be changes in or deviations from procedures

Training is provided through the Key Technology, Inc., Employee Safety Training and Certification Program. It is also important that employees fully understand the roles and training requirements of attendants, entrants and entry supervisors. Upon completion of training, Key Technology, Inc., will issue certificates indicating each employee's name, dates of training, and name of the trainer to be made available to employees and their authorized representatives.

Training Requirements and Responsibilities of Entry Supervisors

- Know, understand and ensure the completion of the training requirements of the authorized entrants and attendants as outlined in their requirements and responsibilities.
- Ensure the entry permit is completely and properly filled out and verify that the air monitoring has been done correctly.
- Coordinate entry operations with other employers who may have employees working in the same confined space so that employees of one employer do not endanger the employees of any other employer.
- Terminate the permit when conditions change either inside or outside the space or when the permit expires.
- Verify that either external or internal rescue services are available.

- Determine when responsibility for a permit space is transferred, and ensure operations remain consistent with the terms on the entry permit.
- Require all unauthorized entrants to leave the permit area.
- Know the signs and symptoms of exposure for the hazardous atmospheres encountered in each confined space.
- Identify method of communication to summon rescue in case of an emergency.

Training Requirements and Responsibilities of Entrants

- Be properly trained on all anticipated hazards of permit-required confined spaces.
- Know how to use all equipment properly.
- Know the signs and symptoms of exposure to hazardous atmospheres and how to perform self-rescue.
- Know the evacuation signal, and understand that the attendant can initiate immediate evacuations requiring all entrants to exit.
- Remain in constant communication with the attendant.
- Alert the attendant when:
  - The entrant recognizes any warning signs or symptoms of exposure to a dangerous situation.
  - The entrant detects a condition that is not allowed on the permit.

Training Requirements and Responsibilities of Attendants

- Know the hazards that may be encountered during entry, including signs and symptoms of exposures and exposure consequences.
- Remain outside the space at all times, and be in constant communication with the entrants. Under no circumstances is an attendant allowed to leave the entrance area of the confined space or perform duties that will interfere with the primary responsibility of communicating with those inside the confined space.
- An attendant is only allowed to monitor one confined space at a time.
- Continuously maintain a proper count and be able to identify all the entrants.
- Monitor activities inside and outside the confined space to ensure the safety of the entrants.
- Set barriers around confined space to ensure pedestrians, vehicles and other external hazards are prohibited from entering work area.
- Takes the following actions when unauthorized persons approach or enter a permit space while entry is underway:
  - Warn the unauthorized persons that they must stay away from the permit space;
  - Advise the unauthorized persons that they must exit immediately if they have entered the permit space
  - Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space
- Summon rescue or other emergency personnel when needed.
- Perform non-entry rescues when possible.
- Warn all unauthorized entrants of emergencies.

Confined Space - Permit System

- Prior to confined space entry, the permit must be filled out completely. The entry supervisor must sign the permit before personnel enter the permit-required confined space.
- Prior to confined space entry, procedures must be developed and implemented for rescuing entrants from permit spaces, for providing necessary emergency services to rescued

employees, for summoning additional rescue and emergency services, and for preventing unauthorized personnel from attempting rescue.

- The completed permit must be posted at the entry point of the confined space so entrants can review it and confirm that the pre-entry steps have been taken.
- The permit is only valid for the duration of the work performed.
- The entry supervisor must terminate the permit when:
  - Work is complete
  - Conditions arise that were not accounted for on the original permit
- After the completion of the entry, the permit will be retained for a period of one year to facilitate review of the program. Any problems encountered during the entry must be noted on the permit and used for review.

Atmospheric Monitoring

- Before an employee enters any confined space, atmospheric testing will be conducted to assess the ambient conditions inside the space.
- The testing will be performed by a qualified person who is capable of operating the atmospheric testing equipment and interpreting the results. The equipment must be capable of detecting a minimum of three hazardous atmospheric variables: flammability, oxygen content and toxicity.
- The devices must be equipped with audio alarms, visual alarms or both.
- Before use or according to the manufacturer's scheduled specifications, the atmospheric equipment must be calibrated with the specified calibration gases in order to properly identify possible hazardous atmospheres.
- When testing for atmospheric hazards, test first for oxygen, then for combustible gases and vapors, and then for toxic gases and vapors. Acceptable atmospheric limits are:
  - Oxygen content: between 19.5 percent and 23.5 percent
  - Flammability: less than 10 percent of the lower flammable limit (LFL) for any substance
  - Toxicity: less than the permissible exposure limit (PEL) as established on the material safety data sheets (MSDSs)
- If the atmospheric monitoring equipment detects levels beyond these ranges, employees will not be permitted to enter the space.
- If levels rise above or fall below the required ranges while employees are in the confined space, the entry will be terminated and the attendant will instruct all employees to evacuate the space.
- The space will be ventilated and rechecked with the atmospheric equipment before subsequent entry is permitted.
- Ventilation equipment will be used when entering any space without respiratory protection.
- If isolation of a confined space is infeasible because the space is large or is port of a continuous system, pre-entry testing shall be performed to the extent feasible before entry is authorized and, if entry is authorized, entry conditions shall be continuously monitored in the areas where authorized entrants are working.
- Each authorized entrant or their representative will be given the opportunity to observe the pre-entry and any subsequent testing or monitoring of permit spaces.
- Employees or their representatives are entitled to request additional monitoring at any time to be done in their presence if the entrant or their representative has reason to believe that the evaluation of that space may not have been adequate.
- Employees or their representatives upon will immediately be provided with the results of any testing conducted.

Personal Protective Equipment

- Work and/or rescue equipment will be immediately available at all times.
- Work and/or rescue equipment will be provided to the employees at no cost and maintained in the proper manner.
- Work and/or rescue equipment will be selected with the potential hazards and possible contingencies associated with the confined space in mind.
- As necessary, PPE will be worn to protect entrants from the hazards associated with the confined space. PPE may include eye protection, hearing protection, hand protection, hard hats, chemically treated protective garments, and respiratory protection, including self-contained breathing apparatus (SCBA) if necessary.
- If the confined space has a height of more than 5 feet with an entry point overhead, each entrant will be required to wear a body harness attached to a mechanical retrieval system, such as a tripod.
- If the confined space is less than 5 feet in height but has a potentially hazardous atmosphere, each entrant will wear a body harness attached to a lifeline that will be monitored by the attendant. This system will allow the attendant to perform a non-entry rescue, if necessary, by pulling the entrant out by the lifeline.
- If the confined space entry requires more than one entrant using an airline system, the attendant will be responsible for ensuring the air hoses and lifelines do not become entangled.

General Safety Issues:

- Under no circumstances will compressed gas cylinders such as those containing oxygen or acetylene be allowed inside the confined space.
- The only pressurized cylinder that will be permitted is a SCBA for respiratory protection.
- If welding or cutting activities are conducted in the confined space, the following must be adhered to:
    - Hoses and torches will be inspected before use. If any piece of equipment is found to be defective, it will be tagged and removed from service immediately.
    - A fire watch will be posted during and after the confined space entry is complete.
    - All torches and hoses will be removed after work has ceased.
- Lockout/tagout procedures will be followed on all applicable equipment.
- When natural lighting is not sufficient, additional lighting will be provided. It must not exceed 12 volts in damp conditions and will be equipped with a ground fault circuit interrupter. In hazardous atmospheres, explosion-proof lighting will be required.
- Communications will be established and used throughout the entire confined space entry.
- Properly rated fire extinguishers will be present, fully charged and functional.

Rescue and Emergency Services

- Rescue services must be either:
    - Provided by the host facility, or
    - Provided by an outside service which is given an opportunity to examine the entry site, practice rescue, and decline as appropriate, or
    - Provided by the employer by selecting a rescue team that is equipped and trained to perform the needed rescue services.
- Non-entry rescue services may be performed by the attendant. The local fire department will be notified before the procedure begins in case non-entry rescue cannot be performed. If an emergency occurs, an attendant will call the fire department. (911)
- Key Technology, Inc. does not work in confined spaces where immediate dangers to life and health conditions are present; therefore, on site rescue services are not necessary.

Alternative Confined-space Entry Plan

Under certain circumstances, Key Technology, Inc. will reclassify a space to allow for a streamlined approach to entering the confined space. This alternative entry plan will be allowed to be implemented only when:

- The only hazard posed by the permit space is an actual or potential hazardous atmosphere.
- Continuous forced air ventilation alone is sufficient to maintain a safe atmosphere.
- Atmospheric monitoring is done to support the claims in items 1 and 2.
- All data from items 1 and 2 are recorded and made available for all entrants to review.

If one of these items cannot be achieved, permit-required confined-space entry procedures must be followed. The person(s) performing initial atmospheric monitoring tests must follow the standard permit-required confined space procedures.

If the items can be achieved and the space is reclassified, the following procedures will be implemented:

- Any condition making it unsafe to remove an entrance cover will be eliminated before the cover is removed.
- After entrance covers are removed, guardrails, barricade tape, etc., will be erected to prevent accidental falls through the opening.
- Atmospheric monitoring to determine oxygen levels, toxic air contaminants, and flammable gases or vapors will be completed before entry operations. Atmospheric monitoring will also be conducted periodically during the entry to ensure these levels have not become more hazardous.
- Continuous forced-air ventilation will be used as follows:
  - The system must be capable of eliminating the atmospheric hazard while entrants are inside the space.
  - The system must be directed to or away from (depending on the airflow direction) the immediate area of the entrants and remain operational during the entire entry procedure.
  - The air supply for the system must come from a clean source and not increase hazards.
- If a hazardous atmospheric condition is detected while entrants are in the confined space, the following steps will be taken:
  - Each entrant will leave the space immediately.
  - The space will be evaluated to determine how the hazardous atmosphere developed.
  - Measures will be taken to protect the entrants from the hazardous atmosphere.

Reclassification of Confined Spaces

When there are changes in the use or configuration of a non-permit confined space that might increase the hazards to entrants, Key Technology, Inc. shall reevaluate that space and, if necessary, reclassify it as a permit-required confined space.

Key Technology, Inc. may have the opportunity to reclassify a permit-required confined space as a non-permit-required confined space provided the following conditions are met:

- The permit space poses no actual or potential atmospheric hazards, and all hazards within the space can be eliminated from outside the space. If it is necessary to enter the space to eliminate the hazards, then permit-required confined space procedures must be followed.
- The space must remain free of atmospheric hazards at all times.
- All information must be documented, certifying the date, location of the space and signature of the person making the determination. This form must be made available to all employees entering the space.

- If hazards arise while employees are working in the space, employees must immediately evacuate and reclassify the space as a permit-required confined space.

The use of forced-air ventilation systems does not constitute the elimination of atmospheric hazards during non-permit-required confined space entries.

Key Technology, Inc.

CONFINED SPACE ENTRY PERMIT

GENERAL INFORMATION
Space to be Entered:
_____

Location/Building:
_____

Permit No. _____

Purpose of Entry:
_____

Authorized Duration of Permit:
Date:_____ to _____ Time:_____
to _____

EQUIPMENT REQUIRED FOR ENTRY & WORK
(Specify as required)
Personal Protective Equipment:
_____
_____
Respiratory Protection:
_____
_____
Atmospheric Testing/Monitoring:
_____
_____
Communication:
_____
_____
Rescue Equipment:
_____
_____
Other:
_____
_____

COMMUNICATION PROCEDURES TO BE USED BY ATTENDANTS AND ENTRANTS:

AUTHORIZED ENTRANTS (List by name or attach roster.)

_____
_____
_____

AUTHORIZED ATTENDANTS (List by name.)

_____
_____
_____

PERMIT SPACE HAZARDS (Indicate hazards with initials)

_____ Oxygen deficiency (less than 19.5 percent)
_____ Oxygen enrichment (greater than 23.5 percent)
_____ Flammable gases or vapors (greater than 10 percent of LFL)
_____ Airborne combustible dust (meets or exceeds LFL)
_____ Toxic gases or vapors (greater than PEL)
_____ Mechanical hazards
_____ Electrical shock
_____ Materials harmful to skin
_____ Engulfment
_____ Other: _____

EMERGENCY SERVICE

Name of Service Phone Number Method of Contact

_____ _____ _____
_____ _____ _____

PREPARATION FOR ENTRY (Check after steps have been taken.)

❑ **Notification** of affected departments of service interruption

Isolation Methods:

❑ Lockout/tagout ❑ Blank/blind ❑ Purge/clean
❑ Atmospheric test ❑ Inert ❑ Ventilate
❑ Barriers ❑ Other _____

Personal Awareness:

❑ Pre-entry briefing on specific hazards and control methods
❑ Notify sub-contractors about permit and hazard conditions
❑ Other: _____

Additional permits required and/or attached:

❑ Hot work ❑ Line breaking ❑ Other _____

TESTING RECORD

Time Oxygen-min.Oxygen-max Flammability H2S Toxic CI2 CO SO2 Heat Other Tester
Acceptable (specify) Initials
Conditions >19.5% <23.5% <10% LEL/LFL <10ppm <0.5ppm <35ppm <2ppm °F/°C
Result _____ _____ _____ _____ _____ _____ _____ _____ _
a.m./p.m.
Result _____ _____ _____ _____ _____ _____ _____ _____ _
a.m./p.m.
Result _____ _____ _____ _____ _____ _____ _____ _____ _
a.m./p.m.
Result _____ _____ _____ _____ _____ _____ _____ _____ _
a.m./p.m.
Result _____ _____ _____ _____ _____ _____ _____ _____ _
a.m./p.m.
Result _____ _____ _____ _____ _____ _____ _____ _____ _
a.m./p.m.
Result _____ _____ _____ _____ _____ _____ _____ _____ _
a.m./p.m.

AUTHORIZATION BY ENTRY SUPERVISORS

I certify that all required precautions have been taken and necessary equipment is provided for safe entry and work in this confined space.

Printed Name Signature Date Time

_____

THIS PERMIT MUST BE POSTED ON JOB SITE
GOOD ONLY ON INDICATED DATE

CONFINED SPACE ENTRY PERMIT ROSTER

Additional Authorized Entrants	Additional Authorized Attendants