

THERMA FOREMEN'S SAFETY BINDER

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<p style="text-align: center;">Safety Manual Safety Inspections</p>

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Revision No.: 2

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SAFETY INSPECTIONS

1. Purpose:

- 1.1 The purpose of this section is to ensure that comprehensive, documented inspections are being completed at Therma work sites including office locations.

2. Scope:

- 2.1 This procedure applies to all Therma jobsites.

3. Responsibility:

- 3.1 Each supervisor will be responsible for making a daily informal tour of the area(s) under his/her supervision.
- 3.2 A Safety Coordinator will make a formal documented safety and health inspection weekly

4. Inspection Procedures:

- 4.1 The supervisor and/or safety coordinator should pay close attention to observing work methods as well as work conditions. Prior to the inspection, the supervisor should review past accidents to determine specific causes and high hazard areas or operations. Such areas need to be given special attention during each inspection.
- 4.2 The supervisor and/or safety coordinator should watch for the following unsafe acts of employees:
- Using equipment without authority.
 - Insecure or disorderly piling or arranging of material.
 - Operating equipment at an unsafe speed.
 - Using defective tools or equipment.
 - Unsafe loading or unloading of trucks, skids, racks, etc.
 - Lifting improperly, or handling loads that are too heavy.
 - Using improper tools, equipment, or vehicles.
 - Using tools, equipment, or vehicles improperly.

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- Making guards or safety devices inoperative.
- Failure to use personal protective equipment.
- Repairing or adjusting machinery in motion or equipment that is under pressure or energized.
- Horseplay.

5. Documentation:

- 5.1 Safety Inspection Checklists will be completed by the safety coordinator from a mobile tablet.
- 5.2 Once the checklist is completed it will be forwarded to the Project Manager/General Foremen. An additional copy will be forwarded to the Safety Department for record keeping.

6. Corrective Action and Follow Up:

- 6.1 Whenever possible, the supervisor will correct unsafe work methods and conditions immediately upon recognition.
- 6.2 Each Safety Inspection Checklist will be updated during the next scheduled tour. **Items not yet corrected will be repeated on the new checklist with a note indicating a "repeat" item and a notation of the date originally identified.*
- 6.3 Hazardous conditions or procedures detected during inspections for which no corrective action can be determined by the supervisor will be brought to the attention of the Safety Coordinator. The Safety Coordinator will consult with the supervisor, maintenance/engineering, immediate manager, and outside consultants, as appropriate to determine suitable corrective action.
- 6.4 Recommendations submitted by insurance company representatives and/or outside consultants will be handled in the same manner as the Safety Inspection Checklists.

<p>Safety Manual</p> <p>Incident Reporting and Investigation</p>

Policy Section No.: 06
Revision No.: 4

Effective: 06-99
Revision Date: 10-10
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INCIDENT REPORTING AND INVESTIGATION

1. Purpose:

- 1.1 Provide procedures and guidelines for reporting and investigating occupational incidents/accidents. Provide an effective tool for identifying and communicating root causes of accidents/incidents, and implement corrective actions to prevent re-occurrences.
- 1.2 Ensure that every incident is investigated, reported appropriately and evaluated for potential lessons learned. An incident is defined as: “any event that requires investigation, either due to the harm it caused to people, the environment, property, or due to the potential harm that it could have caused”.
- 1.3 These procedures cover three types of work-related incidents:
 - Life-threatening injuries or illnesses.
 - Non-life-threatening injuries or illnesses / first aid.
 - Non-injury incidents, including close calls and near misses.
- 1.4 Injuries shall be recorded and reported as required by 29 CFR Part 1904

2. Scope:

- 2.1 This applies to all Therma employees, employees of all subcontractors and sub-tier contractors.

3. Reporting Requirements:

- 3.1 The local Cal-OSHA District Office shall be notified when a serious injury occurs, it is defined as: “Any injury or illness occurring in a place of employment which requires hospitalization for a period in excess of 24 hours for other than medical observation or in which an employee suffers a loss of any member of the body or suffers any serious degree of permanent disfigurement”.
- 3.2 All serious injuries and deaths must be reported immediately to the nearest Cal-OHSA office by telephone, in person, or by telegraph, as soon as practicably possible or within eight (8) hours of having knowledge.
- 3.3 Each report shall include:

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- Time and date of accident.
- Employee's name, address, and phone number.
- Name and title of person reporting the accident.
- Address of site accident.
- Name, phone number and person to contact at site of accident.
- Name and address of injured employee
- Nature of injury
- Location where injured employee was moved to.
- List and identity of other law enforcement agencies present at the site of accident.
- Description of the accident and whether the accident scene or instrumentality has been altered.

4. Reporting Sequence:

- 4.1 Life Threatening injuries or illnesses. (*Immediate notification required.)
 - Call 911
 - Call Site Security (if applicable)
 - Notify supervision
 - Notify owner/client
 - Notify Therma Safety Department
 - Therma Safety Department will notify Cal-OSHA, insurance carrier, company management, if applicable.
- 4.2 Non-Life threatening injuries / illness / first aid. (*Immediate notification required.)
 - Notify supervision
 - Supervision to determine and ensure appropriate first aid provided is conducted
 - Notify owner/client
 - Notify Therma Safety Department
- 4.3 Non-injury incidents, including close calls, and near misses. (*Immediate notification required.)
 - Notify Supervision
 - Advise owner/client
 - Contact Therma Safety Department

5. Investigation Responsibilities:

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- 5.1 Immediate supervisors of injured/ill employee(s) are responsible for collecting and preserving information that will be used to complete the investigation report.
- 5.2 All information including written data, diagrams, witness statements, and/or pictures shall be forwarded to the safety department within 24 hours and will be included in the final report.
- 5.3 The safety department shall prepare the final investigation report.
- 5.4 The completed report shall be submitted for management review within 72 hours.
- 5.5 In the event of a near-miss incident, the employee's immediate supervisor shall complete the incident report and forward the report to the safety department for review.

6. Investigation Evidence:

- 6.1 The employee's immediate supervisor shall identify any evidence that might include; a listing of people, equipment, materials involved, and a recording of environmental factors such as weather, illumination, temperature, noise, ventilation, etc.
- 6.2 The employee's immediate supervisor shall collect and preserve evidence such as people, positions of equipment, parts and papers. Notes, photographs, and witness statements shall be secured and forwarded to the safety department.
- 6.3 If applicable, collected evidence shall be reviewed and incorporated into the final report.

7. Investigation Witness Statements:

- 7.1 Witness statements from interviews shall be collected and incorporated into the final report.
- 7.2 Should follow-up interviews be required, they will be conducted by members of the safety department.

8. Investigation Equipment and Supplies:

- 8.1 The company shall make available all necessary investigation equipment and supplies.
- 8.2 Equipment and supplies may include but not limited to:
 - Pens/paper clipboard
 - Measuring equipment
 - Camera
 - Audio recorder for witness interviews

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- Marking devices such as flags

9. Investigation Report:

9.1 All possible questions regarding the accident should be answered, and the corrective actions to prevent a recurrence should be listed. The following questions should be helpful in completing the report:

- **Who was involved:**
Accidents usually affect more than just the injured person, and very often, more than just the injured person contributed to the cause. **Who**, therefore, should go beyond who was injured and who was present. **Who** supervised the injured employee? **Who** failed to report the unsafe condition? All of those people involved are important to the underlying cause of the accident. Get the names of **everyone involved!**
- **Where Did the Accident Occur?**
Again, we must look beyond the obvious answer to this question. The name of the department or general area is not enough. A detailed description of the accident site should be included. Also, determine if the people involved were where they were supposed to be. Was the equipment in its proper location?
- **What Happened?**
The question can be further broken down to uncover the following acts:
 1. What was being done? (The answer to this question describes an action or procedure.)
 2. What things are involved? (A description of the tool or equipment that was involved answers this question.)
 3. What was the result? (This is answered by a description of the actual injury, including the nature of the injury and the part of the body injured.)
- **When:**
The answer to this question requires more than just the date. The time of day, the day of the week, and did the accident occur at the beginning or end of a shift can also be very important.

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- **How Did the Accident Occur?**
The answer to this question brings together all the facts of the accident. The answer to how is a description of the people, things, places, and times, as they all combine into a complete event. The exact sequent of events that led to the accident should be reported.
- **Why Did the Accident Occur? (Root Cause)**
In order to determine or recommend what corrective action should be initiated, it must be determined exactly why the accident occurred. Under no circumstances should carelessness be considered the cause of any accident. The word carelessness does not describe the reasons for a person's behavior. What contributed to the accident may have been inattention, inadequate training, failure to report a hazard, etc. To determine root cause, the following types of questions need to be answered:
 - **Why** was the injured person inattentive?
 - **Why** he/she was poorly trained?
 - **Why** did someone fail to report an unsafe condition/procedure?
 - **Why** did what happened produce an accident?
 - **Why** did the combination of all the factors that made up the event result in an injury?
 - **Why** did the event result in anything other than an ordinary, everyday occurrence?

These questions and others you can think of will help you determine **IF** and **WHY** an unsafe act occurred.

10. Recommend Corrective Action:

- 10.1 After evaluating the facts of an accident, you will most likely find that the accident was caused by a combination of unsafe acts and/or unsafe conditions. Recommendations to prevent a recurrence should be directed toward correcting all contributing factors leading to an unsafe condition and/or unsafe act.
- 10.2 **NOTE:** It is important to remember that an accident investigation is not a trial to find fault or blame. The purpose is to find accident causes so that similar accidents may be prevented by physical or mechanical improvement or employee training and motivation.

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- 10.3 During the safety department review of the incident report, corrective action responsibilities will be assigned. Tracking and closure will be the responsibility of the safety department.

11. “Lessons Learned”:

- 11.1 Incident reports shall be reviewed during management safety meetings. “Lessons learned” shall be established from each incident. The information will be communicated to the appropriate department manager and passed on to the department’s employees.
- 11.2 Changes to processes or procedures will be made to prevent re-occurrence or similar events from occurring.

12. Training:

- 12.1 Employees involved in the incident reporting and investigation process shall be trained in their responsibilities and incident investigation techniques.
- 12.2 Training shall be performed when those responsibilities are first assigned.

13. First Response / Loss Control:

- 13.2 After immediate rescue and treatment of injured workers and if building structural damage has occurred, Therma may be required to initiate with the owner/client post incident loss control activities.
- 13.3 Activities may include:
- Notifying building maintenance of the building damage.
 - Notifying engineering personnel for structural integrity assessment.
 - Assisting with coordination of structural bracing.
 - Assist with contacting appropriate agencies for non-emergency chemical containment and clean up.
- 13.4 Personnel responsible for initiating first response / loss control activities during the immediate post-incident phase shall be trained prior to the assignment of those duties.



THERMA ACCIDENT/EXPOSURE INVESTIGATION REPORT

Job Site:		Date:	
Investigation Team:		Job Number:	
Employee Name:		Employee ID #:	
Sex:		Job Description:	
Department:		Time of Work (Start):	
Project Manager:		Foreman:	
General Foreman:		Journeymen/Leadsman:	
Accident Date:		Time of Accident:	
Date Reported to Supervisor:		Time Reported:	
Date of Investigation:		Time of Investigation:	
Nature of Incident:			
Type of Injury:			
Referred to Medical Facility/Doctor:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Medical Facility/Doctor:
Did Employee Return to Work?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Date/Time:
Injured Employee Interview/Statement:			
Witnesses Interviews/Statements (Explain):			
Photograph(s) of Site: (attach)		Yes <input type="checkbox"/>	No <input type="checkbox"/>
Diagram(s) of Site: (attach)		Yes <input type="checkbox"/>	No <input type="checkbox"/>
Equipment Records Reviewed:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Attached
Accident/Exposure Incident Description:			
Root Cause:			
Corrective Action Plan and Responsibility:			
PPE's Used/Needed:			

Please use back side for any additional information.

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THERMA

Mold Action Plan

RESPONSE

CONTENTS — RESPONSE TO MOLD PROBLEMS

- 1. Introduction To Response Plans**
- 2. Pre-Event Preparation**
- 3. Response During Construction**
- 4. Response Post-Construction**
- 5. Reference Internet Links**
- 6. Reference Documents**
 - a) Checklist For Mold Remediation, From Epa Guidelines**
 - b) Water Damage Response Guidelines (Table 1) From Epa Guidelines**
 - c) Record Document**

Mold Action Plan

Response

1. INTRODUCTION TO RESPONSE PLANS

There are two distinct situations where a response plan is required. The situations are:

1. During Construction

2. Post Construction

Given the unique conditions existing in each situation, Therma has produced two distinct response plans. The response plan during construction is much more general beyond the point of cleaning up the excess moisture and documentation. In the post construction situation, our response plan is more specific and driven by the degree of water/mold intrusion. We utilized a flow chart with references to documents and links that cite specific government guidelines.

2. PRE-EVENT PREPARATION

By definition, water intrusion events will be addressed as quickly as possible to minimize damage and possible mold growth. Below is a list of equipment that is kept in order to prepare for potential water intrusions. Preparation also includes the identification of potential resources, i.e. water cleanup/restoration specialists, certified industrial hygienists, mold remediation specialists, etc. that may be called upon to assist in all aspects of this response plan. These resources may assist in all phases of the plan from the initial water intrusion to the final report.

Equipment List

- Moisture Meter
- Dehumidifiers
- Floor blowers/dryers
- Wet/Dry Vacuum

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Notification Procedures

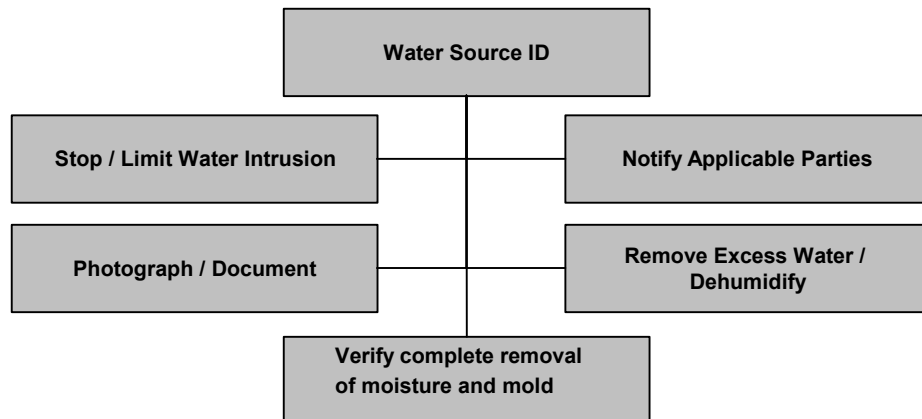
Notification to one or more of the following parties should be seriously considered:

1. Insurer
2. Legal Department
3. All parties affected by the water intrusion

3. DURING CONSTRUCTION

The flow chart below details steps for responding to a water intrusion event that takes place during construction.

Figure 1: Water Intrusion Response Plan Flow Chart – During Construction



Guiding Principles

If large-scale water intrusion occurs, it may be beneficial to hire an outside Restoration Contractor to assist in the drying and cleanup if Therma does not have the necessary resources. Emphasis should be to dry salvageable materials and remove other materials immediately after water intrusion, prior to any potential mold growth. Refer to Table 1 of EPA Guidelines for reference (attached)

After drying, cleanup, and repair of leak, affected areas should be periodically checked for moisture or mold to ensure problem does not reappear.

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4. POST CONSTRUCTION

The response plan for a finished structure (post construction) has three governing parameters, listed below:

1. How long since the water intrusion occurred?
2. Has visible mold growth occurred?
3. Size of the water damage or mold growth.

The attached flow chart addresses these issues. While the flow chart is a basic blue print for managing a response plan, judgment will be required for some decisions, such as whether to obtain a Hygienist or Remediation Contractor for relatively minor damage. **Specific instructions for remediation work are detailed in the EPA guidelines (web link below).**

The response plan flowchart has also been linked to Checklist for Mold Remediation, from EPA 402-K-01-001: Mold Remediation in Schools and Commercial Buildings.

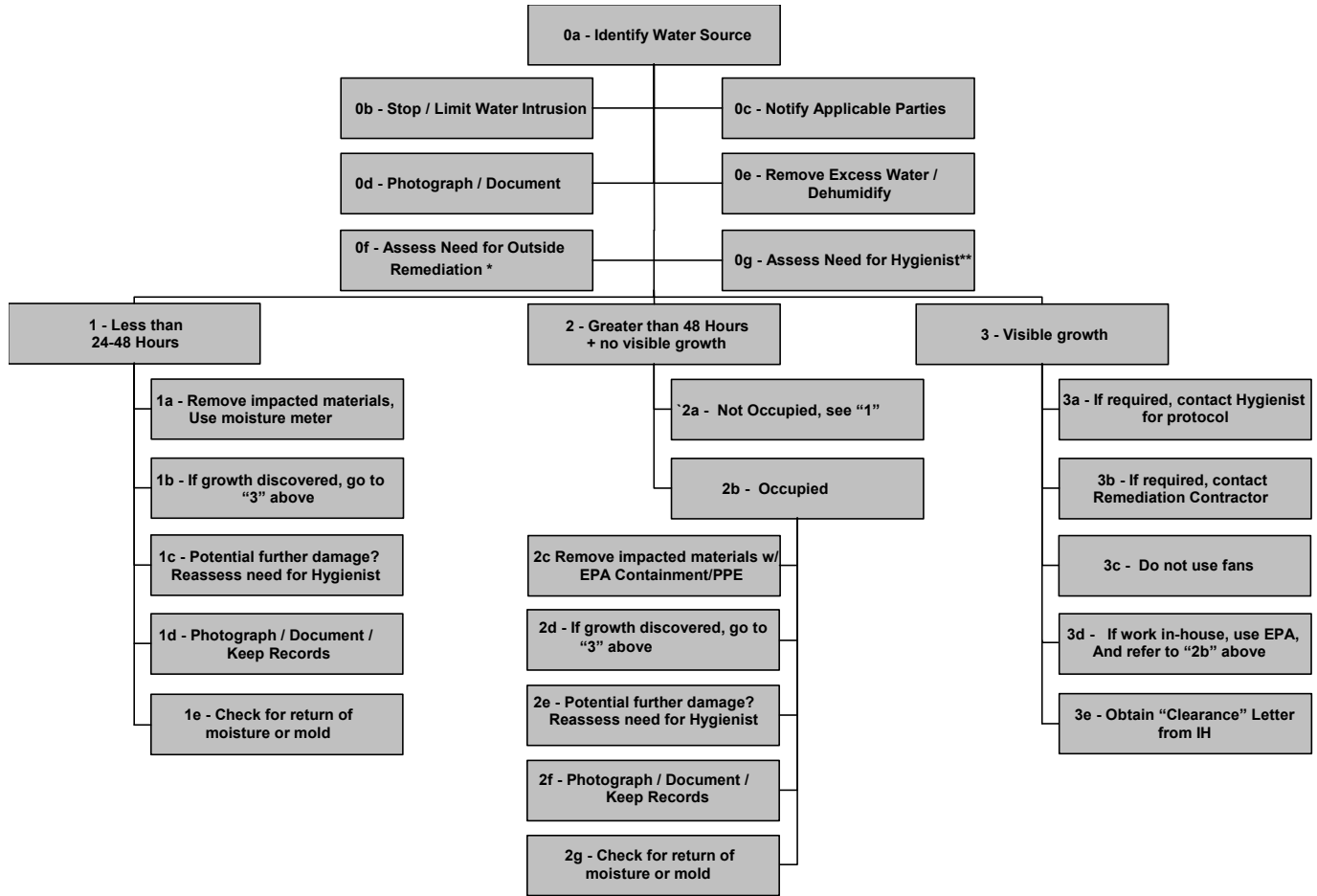
Figure 2: Water Intrusion Response Plan Flow Chart – Post Construction

* Requirement for Remediation Contractor varies by case and by Therma's capabilities. Outside specialists may be necessary for larger events, where Therma may not have resources to completely dry the building materials quickly.

** Requirement varies by size and occupancy.

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5. REFERENCE LINKS

EPA: Mold Remediation in Schools and Commercial Buildings (EPA 402-K-01-001, March 2001):

PDF Format: <http://www.epa.gov/iaq/molds/graphics/moldremediation.pdf>

HTML: <http://www.epa.gov/iaq/molds/>

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6. REFERENCE DOCUMENTS

CHECKLIST FOR MOLD REMEDIATION, FROM EPA 402-K-01-001: MOLD REMEDIATION IN SCHOOLS AND COMMERCIAL BUILDINGS:

CHECKLIST FOR MOLD REMEDIATION*

Investigate and Evaluate Moisture and Mold Problems

- ☐ Assess size of moldy area (square feet).
- ☐ Consider the possibility of hidden mold.
- ☐ Clean up small mold problems and fix moisture problems before they become large problems.
- ☐ Select remediation manager for medium or large size mold problem.
- ☐ Investigate areas associated with occupant complaints.
- ☐ Identify source(s) or cause of water or moisture problem(s).
- ☐ Note type of water-damaged materials (wallboard, carpet, etc.).
- ☐ Check inside air ducts and air handling unit.
- ☐ Throughout process, consult qualified professional if necessary or desired.

Communicate with Building Occupants at All Stages of Process, as Appropriate

Designate contact person for questions and comments about medium or large-scale remediation as needed.

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Plan Remediation

- ☐ Adapt or modify remediation guidelines to fit your situation; use professional judgment.
- ☐ Plan to dry wet, non-moldy materials within 48 hours to prevent mold growth.
- ☐ Select cleanup methods for moldy items.
- ☐ Select Personal Protection Equipment – protect remediators.
- ☐ Select Containment Equipment – protect building occupants
- ☐ Select remediation personnel who have the experience and training needed to implement the remediation plan and use Personal Protection Equipment and containment as appropriate.

Remediate Moisture and Mold Problems

- ☐ Fix moisture problem, implement repair plan and/or maintenance plan.
 - ☐ Dry wet, non-moldy materials within 48 hours to prevent mold growth.
 - ☐ If mold is detected, contact a company designated hygienist for remediation procedures.
-

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WATER DAMAGE RESPONSE GUIDELINES, FROM EPA 402-K-01-001: MOLD REMEDIATION IN SCHOOLS AND COMMERCIAL BUILDINGS:

TABLE 1: WATER DAMAGE – CLEANUP AND MOLD PREVENTION	
Guidelines for Response to Clean Water Damage Within 24-48 Hours to Prevent Mold Growth*	
Water-Damaged Material¹	Actions
Books and papers	<ul style="list-style-type: none"> • For non-valuable items, discard books and papers. • Photocopy valuable/important items; discard originals. • Freeze (in frost-free freezer or meat locker) or freeze-dry.
Carpet and backing – dry within 24-48 hours ²	<ul style="list-style-type: none"> • Remove water with water extraction vacuum. • Reduce ambient humidity levels with dehumidifier. • Accelerate drying process with fans.
Ceiling tiles	<ul style="list-style-type: none"> • Discard and replace.
Cellulose insulation	<ul style="list-style-type: none"> • Discard and replace.
Concrete or cinder block surfaces	<ul style="list-style-type: none"> • Remove water with water extraction vacuum. • Accelerate drying process dehumidifiers, fans, and/or heaters.
Fiberglass insulation	<ul style="list-style-type: none"> • Discard and replace.
Hard surface, porous flooring ² (Linoleum, ceramic tile, vinyl)	<ul style="list-style-type: none"> • Vacuum or damp wipe with water and mild detergent and allow to dry; scrub if necessary. • Check to make sure underflooring is dry; dry underflooring if necessary.
Non-porous, hard surfaces (Plastics, metals)	<ul style="list-style-type: none"> • Vacuum or damp wipe with water and mild detergent and allow to dry; scrub if necessary.
Upholstered furniture	<ul style="list-style-type: none"> • Remove water with water extraction vacuum. • Accelerate drying process dehumidifiers, fans, and/or heaters. • May be difficult to completely dry within 48 hours. If the piece is valuable, you may wish to consult a restoration/water damage professional who specializes in furniture.

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TABLE 1: WATER DAMAGE – CLEANUP AND MOLD PREVENTION	
Guidelines for Response to Clean Water Damage Within 24-48 Hours to Prevent Mold Growth*	
Water-Damaged Material¹	Actions
Wallboard (Drywall and gypsum board)	<ul style="list-style-type: none"> • May be dried in place if there is no obvious swelling and the seams are intact. If not, remove, discard, and replace. • Ventilate the wall cavity, if possible.
Window drapes	<ul style="list-style-type: none"> • Follow laundering or cleaning instructions recommended by the manufacturer.
Wood surfaces	<ul style="list-style-type: none"> • Remove moisture immediately and use dehumidifiers, gentle heat, and fans for drying. (Use caution when applying heat to hardwood floors.) • Treated or finished wood surfaces may be cleaned with mild detergent and clean water and allowed to dry. • Wet paneling should be pried away from wall for drying.
<p>*Even if materials are dried within 48 hours, mold growth may have occurred. Items may be tested by professionals if there is doubt. Note that mold growth will not always occur after 48 hours; this is only a guideline.</p> <p>These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then Personal Protective Equipment and containment are required by OSHA. An experienced professional should be consulted if you and/or your remediators do not have expertise remediating in contaminated water situations. Do not use fans before determining that the water is clean or sanitary.</p> <p>¹ If a particular item(s) has high monetary or sentimental value, you may wish to consult a restoration/water damage specialist.</p> <p>² The subfloor under the carpet or other flooring material must also be cleaned and dried. See the appropriate section of this table for recommended actions depending on the composition of the subfloor.</p>	

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RECORD DOCUMENT

Contractor Abatement/Mitigation Record Post Flood Or Water Intrusion Event Contractor(s):

Date	Location*	Describe How The Area Was Selected Pre-Abatement				Describe the Nature and Extent of Abatement				Describe How The Area Was Cleared Post-Abatement				Assigned/Responsible Subcontractors			Date Release To Owner	
														#1	#2	#3		
		Date	Visual	Instrument	% Moisture	Drywall Removed (SF)	Describe Equipment Used				Date	Air Samples	Visual	% Moisture	Date(s)			
							Wet/Dry Vacuum (Hrs)	Dehumidify	HVAC or HEPA	Mach. ID					Assigned	Cleared		Assigned

Superintendent/Project Manager: _____

Date: _____

Key:
+ - Record date of first discovery

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* - Any method maybe used, i.e. room number, assigned designations letters, numbers, etc

Standard Operating Procedure

Toolbox Meeting Policy

Policy Section No.:08

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TOOLBOX MEETING POLICY

1. Purpose:

- 1.1 To establish a policy as it pertains to weekly safety meetings.

2. Responsibility:

- 2.1 It shall be the responsibility of the Project Managers and Foremen to follow this procedure.

3. Procedure:

- 3.1 All Project Managers must ensure their project staff attends weekly safety meetings.
- 3.2 All Foremen must conduct the weekly meeting.
 - 3.2.1 The topic and outline will be sent out at the beginning of each month.
 - 3.2.2 After discussing the weekly topic, site specific issues/concerns will be discussed.
- 3.3 Each employee attending the meeting must print and sign their name on the safety meeting sheet.
- 3.4 After the meeting, copies shall be sent to Therma's main office with time cards.
 - 3.4.1 If requested, copies shall be made and sent to general contractor/owner.

4. Records:

- 4.1 Training records will be maintained in accordance with Therma's Injury Illness Prevention Program (3 years).

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5. Tips for Successful Meetings:

- 5.1 Limit each talk to between 10 and 15 minutes. Don't let the meetings turn into a gripe session about unrelated topics. STAY FOCUSED!
- 5.2 Give recognition. Start each meeting by complimenting the workers for some recent good work by saying something in a positive sense.
- 5.3 Give the talk in your own words. Each of the safety topics gives general information and should only be a reference for your discussions. You should always customize your talks to fit your own operations.
- 5.4 Get your people to participate. The purpose is to get workers to think about safety problems. Make the talk a discussion and have the workers identify hazards and explain what to do about them. Encourage suggestions for improving jobsite safety.
- 5.5 Reinforce the positive points brought out during the discussion at the end of the meeting.

Fit for Duty

1. Purpose and Scope:

- 1.1. Therma employees are expected to report for work fit for duty, which means able to perform their job duties in a safe, appropriate and an effective manner free from the adverse effects of physical, mental, emotional and personal problems.
- 1.2. It is the goal of Therma to provide a safe workplace for all employees. To accomplish this goal we have adopted the following fitness for duty policy requirements. Supervisors will work with the H.R. Department when they have a concern about an employee's fitness for duty.

2. Responsibility:

- 2.1. Management personnel are responsible for monitoring the attendance, performance and behavior of their employees. When an employee's performance and/or behavior(including the odor of alcohol or possible use of any illegal substance) appears to be unsafe, ineffective and/or inappropriate, it is every manager's responsibility to challenge the employee's behavior and the ability to function, remove the employee from the job and contact the H.R. Department.
- 2.2. Supervisors have a special responsibility to implement this policy in a consistent and fair manner.

3. Training and Safe Work Requirements (Skills and Knowledge):

- 3.1. Employees need to have the required skills to perform their assigned tasks. This is evaluated and documented by any or all of the following for evaluation of the employee's required skills:
 - Certifications, licenses or other documentation verification
 - Task testing
 - On the job monitoring
 - Performance evaluations
 - Training and training retention

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- 3.2. Employees are properly trained for their assigned tasks. Employees must receive training specific to their assigned task.
 - Examples might be hot work, scaffold use, equipment operator qualifications; respirator fit test, etc. or based on a training matrix that reflects the job description and/or tasks being performed. All training is to be documented.
- 3.3. Safe work practices and procedures must be followed. Safe work procedures must be in place prior to work beginning. Employees shall follow our and our client's safety requirements.
 - Examples may include hot work permitting, confined space, lockout tag out, process safety management, electrical safety, operator safety and other standard work practices, safety rules or procedures.

4. Personal Medical Reporting Requirements:

- 4.1. Employees need to report all medications to their supervisor they are taking that could impair their ability to work safely. Over-the-counter medications such as allergy or cold and flu medications could also impair one's ability to perform safely and must also be reported to their

5. Client and Drug and Alcohol Testing Requirements:

- 5.1. Drug and alcohol testing for pre-employment and post-accident as prescribed by the host facility shall be implemented. Procedures must include and be implemented for drug and alcohol testing as prescribed by DOT or the host client facilities.

6. Confidentiality:

- 6.1. Medical Records and other related records are protected by state and federal confidentiality laws and Therma's policy. Medical records will be maintained in the employee's medical file at the corporate office. Employee medical records will not be released to unauthorized personnel without the employee's written consent or subpoena in accordance with state and federal laws.

7. Self-Reporting:

- 7.1. Employees are responsible for notifying their supervisor if they are fatigued to the point of not being able to perform their duties safely. Employees must be responsible for ensuring they are physically

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and mentally fit to perform their job functions safely. Employees must take responsibility for their own safety as well as not reporting to work in a condition as to endanger the safety of their fellow workers.

- 7.2. Disciplinary action may occur for an employee reporting to work in a condition which could endanger their safety or the safety of any other person(s). See below for Management Referral in case there is a question of the employee's ability to work safely.

8. Management Referral:

- 8.1. When any manager or their designee observes an employee who is not performing his/her job safely, appropriately, and effectively, or an odor of alcohol is present, or whose behavior is inappropriate, that manager is to remove the employee from her/his duty immediately and call the H.R. Director or local safety team leader. The employee may be referred to a medical provider for a fitness for duty exam.
- 8.2. The Fitness for Duty evaluation may include testing for chemical (e.g. alcohol and drug) levels, referral for psychiatric evaluation or any other evaluation or follow-up deemed necessary.
- 8.3. The manager or designee must document the reasons for the fitness for duty request by recording the employee's behavior and noting the names of any witnesses who observed that behavior. Documentation must be submitted to the H.R. Director.
- 8.4. The employee is required to cooperate fully with the manager and medical personnel. The employee must sign consent forms for both the fitness examination and communication of its results in confidence to the H.R. Director. Refusal will be grounds for disciplinary action.
- 8.5. Medical personnel will advise the H.R. Director if the employee is fit or not fit for duty.
- 8.6. If medical personnel determine that the employee is FIT FOR DUTY, the employee must contact the H.R. Director and provide a return to work authorization. The H.R. Director and the employee's supervisor will determine if discipline is required in situations where misconduct may have occurred.
- 8.7. If medical personnel determine that the employee is NOT FIT FOR DUTY:
- The supervisor shall ensure the employee has safe transportation home.

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- The employee may not be permitted to return to work until a return to work authorization has been provided by medical personnel.
- The supervisor and the H.R. Director will determine discipline in situations where misconduct has occurred.

<p style="text-align: center;">Safety Manual</p> <p style="text-align: center;">Stop Work Authority (SWA)</p>

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Stop Work Authority (SWA)

1. Purpose:

- 1.1 Stop Work Authority (SWA) is a program designed to provide employees with the responsibility and obligation to stop work when a perceived unsafe condition or behavior may result in an unwanted event

2. Scope:

- 2.1 Stop Work Authority should be initiated for conditions or behaviors that threaten danger or imminent danger to person(s), equipment or the environment. Situations that warrant a SWA may include, but are not limited to the following:
- Alarms
 - Change in condition
 - Changes to scope of work or work plan
 - Emergency situation
 - Equipment used improperly
 - Lack of knowledge, understanding or information
 - Near-miss incident
 - Unsafe conditions

3. Responsibility:

- 3.1 Senior Management: Creates a culture that promotes SWA, establishes clear expectations and responsibilities. Demonstrates support for using SWA without the potential for retribution. Resolves SWA conflicts when they arise. Holds employees and contractors accountable for full compliance with the SWA program.
- 3.2 Supervisors and Managers: Promotes a culture where SWA is freely exercised, SWA requests are honored and resolved before resuming operations. Ensures necessary stop work follow-up is completed.

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3.3 Safety Department: Provides training, support, documentation and monitors compliance of the SWA program.

3.4 Company employees and contractors: Initiate stop work (in good faith) and support stop work initiated by others.

4. Procedure:

4.1 Stop

- When an employee or contractor perceives condition(s) or behavior(s) that pose imminent danger to person(s), equipment or environment he or she must immediately initiate a stop work intervention with the person(s) potentially at risk.
- If the supervisor is readily available and the affected person(s), equipment or environment is not in imminent danger, coordinate the stop work action through the supervisor. The stop work action should be clearly identify as a stop work action and initiated in a non-combative manner.

4.2 Notify

- Notify affected personnel and supervision of the stop work action. If necessary, stop work activities that are associated with the work area in question. Make the area(s) as safe as possible by removing personnel and stabilizing the situation.

4.3 Investigate

- Affected personnel will discuss the situation and come to an agreement on the stop work action.
- If all parties come to an agreement the condition or behavior is safe to proceed without modifications, (e.g. the initiator was unaware of certain information or circumstances), the affected persons should show appreciation to the SWA initiator for their concern and then resume work. The SWA is complete at this point and no further steps are needed.
- If it is determined and agreed the SWA is valid, A Stop Work Issuance Form will be completed. The condition(s) or behavior(s) that pose threats or imminent danger to person(s), equipment or the environment must be resolved before restarting work. Work will be suspended until a proper resolution is achieved.

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4.4 Correct

- Modifications to the affected area(s) will be made and the affected area(s) will then be inspected by qualified employee(s) to verify completeness of the modifications and to verify all safety issues have been properly resolved.

4.5 Resume

- The affected area(s) will be reopened for work by personnel with restart authority. All affected employees and contractors will be notified of what corrective actions were implemented and that work will recommence.
- In the event an employee still believes it is unsafe, they will be assigned to another job with absolutely no retribution.

4.6 Follow up

- The supervisor will provide the root cause analysis to the stop work action and identify any potential opportunities for improvement. The Safety Department publishes the incident details regarding the stop work action to all managers and employees outlining the issue, corrective action and lessons learned. Management will promptly review all stop work reports in order to identify any additional investigation or required follow-up.

<p>Safety Manual</p> <p>Hazard Communication Program</p>

Policy Section No.: 23
Revision No.: 3

Effective: 06-99
Revision Date: 08-15
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HAZARD COMMUNICATION PROGRAM

1 Purpose and Scope:

- 1.1 To ensure information about the dangers of all hazardous chemicals used by Therma is known by all affected employees, the following hazardous information program has been established. Under this program, you will be informed of the contents of the OSHA Hazard Communication standard, the hazardous properties of chemical with which you work, safe handling procedures, and measures to protect yourself from these chemicals.
- 1.2 This program applies to all work operations in our company where you may be exposed to hazardous chemical under normal working conditions or during an emergency situation. All work units of this company will participate in the Hazard Communication Program. Copies of the program are contained in the EHS Manual and in each SDS Binder and are available upon request from the Safety Department.
- 1.3 This program is in accordance with Hazard Communication Standard, 29 CFR 1910.1200.

2 Responsibility:

- 2.1 The Safety Department Manager is the program coordinator, with overall responsibility for the program, including reviewing and updating this plan as necessary.
- 2.2 It is the responsibility of the Safety Department Manager to obtain updates of Proposition 65 listed chemicals and provide new information that may affect any employee.
- 2.3 It is the responsibility of all Project Managers and/or Superintendents to ensure that a list of hazardous substances and all Safety Data Sheets (SDS) are obtained prior to any required work.
- 2.4 In the event of any new introduced and potential health and safety exposure, it is the responsibility of the Project Manager and/or Superintendent to inform their crew and the Safety Department Manager of this information.

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- 2.5 It is the responsibility of the Project Manager to inform the Safety Department Manager where additional safety and health training may be necessary on a job site.
- 2.6 It is responsibility of the Facilities Manager to ensure all outside contractors work safely in our campus and to protect our employees from chemicals used by outside contractors' procedures.
- 2.7 It is the responsibility of the supervisor to ensure all employees on site are trained regarding the presence of hazardous chemicals.

3 **Policy:**

- 3.1 Safety Data Sheet (SDS):
 - 3.1.1 The supervisor shall obtain legible copies of all SDSs from the Safety Department for those hazardous substances that employees may be exposed to. These copies shall be in a location where employees may easily read them, during all work shifts.
 - 3.1.2 If SDSs are missing or new hazardous substances(s) in use do not have an SDS, or if an SDS is incomplete, contact the Facilities Manager of the customer site or the Safety Department Manager immediately to request a new SDS.
 - 3.1.3 If a particular location requires an SDS and/or the data sheet can not be obtained, no employee shall be permitted in that location.
 - 3.1.4 SDS for new chemicals introduced into the work site shall be forwarded to the Safety Department.
 - 3.1.5 The Safety Department shall review new SDSs for carcinogenic or extremely hazardous chemicals and shall inform employees how they will be protected.
 - 3.1.6 The Safety Department shall manage the listings of chemicals.
 - 3.1.7 The Safety Department shall maintain the SDS Master.
 - 3.1.8 When new chemicals are received, or new information has become obtained for an existing SDS, the Safety Department will update the SDS Master (including date the chemicals that were introduced or updated).
- 3.2 List of Hazardous Substances:

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3.2.1 It is the responsibility of the supervisor/project manager to obtain any/all SDSs from these resources:

3.2.1.1 Subcontractor.

3.2.1.2 General Contractor.

3.2.1.3 Customer.

3.2.1.4 Hazardous Substance list used by Therma.

3.2.2 It is the responsibility of the supervisor to ensure all employees are informed of all known hazardous substances.

3.2.3 It is the responsibility of the supervisor to complete a hazardous substance inventory prior to starting any job.

3.2.3.1 The List of Hazardous Substances will be kept in a location that is accessible to all employees.

3.3 Labels and Other Forms of Warning:

3.3.1 Before hazardous substance containers are released to the work area, verify that all primary and secondary containers are labeled.

3.3.2 The Primary Container shall address the following: Identity of the hazardous substance(s), applicable hazard warnings, and name/address of the manufacturer.

3.3.3 The Secondary Container shall address the following: Identity of the hazardous substance(s), and applicable hazard warnings.

3.3.4 To address exposure to Proposition 65 chemicals, the Safety Department Manager will provide clear and reasonable warnings to individuals prior to exposure by means of posting signs conspicuously, labeling consumer products, and training employees.

3.3.5 Labels shall be legible and in English. For non-English speaking, provisions shall be made to provide information in the native language.

3.3.6 Container labels shall not be defaced or removed.

3.4 Employee Information and Training:

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3.4.1 All new employees shall receive hazard communication training at the time of their initial assignment and whenever a new chemical is introduced into their work area.

3.4.2 Prior to starting work in a location which contains hazardous chemicals, all employees shall attend a health and safety-training. The training will provide information on the following:

- 3.4.2.1 The requirements of the hazard communication regulation, including the employees' rights under the regulation.
- 3.4.2.2 The location and availability of the written hazard communication program.
- 3.4.2.3 Any operation in the work area, including non-routine tasks, where hazardous substances or carcinogens/reproductive toxins are present and exposures are likely to occur.
- 3.4.2.4 Method and observation techniques used to determine the presence or release of hazardous substances in the work area.
- 3.4.2.5 Protective practices the company will take to minimize or prevent exposure to these substances.
- 3.4.2.6 How to read labels and review SDSs in order to obtain hazard information.
- 3.4.2.7 Information of the physical and health effects of the potential hazardous substances exposure.
- 3.4.2.8 Symptoms of overexposure.
- 3.4.2.9 Measures employees need to put into practice to reduce or prevent exposure to hazardous substances by engineering controls, work practices, and use of personal protective equipment (PPE).
- 3.4.2.10 Emergency and first aid procedures to follow if employees are exposed to hazardous substances.
- 3.4.2.11 The location and interpretation, if needed, of warning signs or placards to communicate that a chemical known to cause cancer or reproductive toxicity is used in the workplace.

3.4.3 Employee training documentation shall be maintained by the Safety Department Manager. Documentation shall include the employee's name, a brief description of the training and trainer's name. Copies of documentation shall be maintained in the employee's individual training file.

3.5 Hazardous Non-routine Tasks:

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3.5.1 If an employee is required to perform a hazardous non-routine task, the affected employee shall be given information by their supervisor on hazards to which they may be exposed during such an activity.

3.5.2 The non-routine task shall address the following information:

3.5.2.1 Specific hazards.

3.5.2.2 Measures the company has taken to reduce the risk of these hazards, such as providing respiratory protection program, and establishing emergency procedures.

3.5.3 The supervisor shall complete a Pre-task Hazard Plan for all hazardous non-routine tasks.

3.5.3.1 Pre-task Hazard Plan shall be reviewed with all affected employees prior to starting the task.

3.6 Labeled/Unlabeled Pipes (if applicable):

3.6.1 Above-ground pipes transporting hazardous substances (gases, vapors, liquids, semi-liquids, or plastics) shall be identified in accordance with T8 CCR, Section 3321, and the Identification of Piping.

3.6.2 Other above-ground pipes that do not contain hazardous substances but may have associated hazards if disturbed or cut (i.e., steam lines, oxygen lines) shall be addressed as follows:

3.6.2.1 The location of the pipe system or other known safety hazard.

3.6.2.2 The substance in the pipe.

3.6.2.3 Potential hazards.

3.6.2.4 Safety precautions.

3.7 Outside Contractors:

3.7.1 Contractors will be informed of our Hazard Communication Policy to ensure they work safely in our campus and to protect our employees from chemicals brought onsite by outside contractors.

3.7.2 Outside contractors shall be informed of hazardous substances, including Proposition 65 chemicals, to which they may be exposed while on the job site.

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3.7.3 Outside contractors shall have available SDSs of chemical/substances brought onto our campus.

3.7.4 Outside contractors shall be informed of protective measures the employees should take to minimize the possibility of exposure.

4 Identification Systems:

4.1 Global Harmonized System of Classification and Labeling of Chemicals (GHS)

Specific sections of GHS labels include the following:



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FLAME OVER CIRCLE

- Oxidizers



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FLAME

- Flammables
- Pyrophorics
- Self-Heating
- Emits Flammable Gas
- Self-Reactives
- Organic Peroxides



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EXPLODING BOMB

- Explosives
- Self-Reactives
- Organic Peroxides



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SKULL AND CROSSBONES

- Acute Toxicity (fatal or toxic)



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CORROSION

- Skin Corrosion/Burns
- Eye Damage
- Corrosive to Metals



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GAS CYLINDER

- Gases Under Pressure



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HEALTH HAZARD

- Carcinogen
- Mutagenicity
- Reproductive Toxicity
- Respiratory Sensitizer
- Target Organ Toxicity
- Aspiration Toxicity



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ENVIRONMENT

- Aquatic Toxicity
 - (Non-Mandatory)



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EXCLAMATION MARK

- Irritant (skin and eye)
- Skin Sensitizer
- Acute Toxicity
- Narcotic Effects
- Respiratory Tract Irritant
- Hazardous to Ozone Layer (Non-Mandatory)



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LABEL EXAMPLE

Xyz Chemical Co.



Warning

Flammable Liquid and Vapor

Harmful if Swallowed

May Cause Damage to Organs (Liver)

May Cause Damage to Organs through prolonged or repeated exposure (Heart)

First Aid

If swallowed

If on skin


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SAFETY DATA SHEET (SDS)




- | | |
|-------------------------------------------------------------------|------------------------------------------------------------------------------------|
| 1. Identification of the substance or mixture and of the supplier | 10. Stability and reactivity |
| 2. Hazard identification | 11. Toxicological |
| 3. Composition/information on ingredients Substance/Mixture | 12. Ecological information |
| 4. First aid measures | 13. Disposal considerations |
| 5. Firefighting measures | 14. Transport information |
| 6. Accidental release measures | 15. Regulatory information |
| 7. Handling and storage | 16. Other information including information on preparation and revision of the SDS |
| 8. Exposure controls/personal protection | |
| 9. Physical and chemical properties | |

4.2 NFPA – National Fire Protection Association Labeling System

	Health Hazard	
	4	Very short exposure could cause death or serious residual injury even though prompt medical attention was given.
	3	Short exposure could cause serious temporary or residual injury even though prompt medical attention was given.
	2	Intense or continued exposure could cause temporary incapacitation or possible residual injury unless prompt medical attention is given.
	1	Exposure could cause irritation but only minor residual injury even if no treatment is given.
	0	Exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials.

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	Flammability	
	4	Will rapidly or completely vaporize at normal pressure and temperature , or is readily dispersed in air and will burn readily.
	3	Liquids and solids that can be ignited under almost all ambient conditions.
	2	Must be moderately heated or exposed to relatively high temperature before ignition can occur.
	1	Must be preheated before ignition can occur.
	0	Materials that will not burn.
	Instability ¹	
	4	Readily capable of detonation or of explosive decomposition or reaction at normal temperatures and pressures .
	3	Capable of detonation or explosive reaction, but requires a strong initiating source or must be heated under confinement before initiation, or reacts explosively with water .
	2	Normally unstable and readily undergo violent decomposition but do not detonate. Also: may react violently with water or may form potentially explosive mixtures with water.
	1	Normally stable, but can become unstable at elevated temperatures and pressures or may react with water with some release of energy , but not violently.
	0	Normally stable, even under fire exposure conditions, and are not reactive with water.
<p>¹ Prior to 1996, this section was titled "Reactivity". The name was changed because many people did not understand the distinction between a "reactive hazard" and the "chemical reactivity" of the material. The numeric ratings and their meanings remain unchanged.</p>		
	Special Hazards	
	<p>This section is used to denote special hazards. There are only three NFPA 704 approved symbols:</p>	

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	OX	This denotes an oxidizer , a chemical which can greatly increase the rate of combustion /fire.
	SA	This denotes gases which are simple asphyxiants . The only gases for which this symbol is permitted are nitrogen, helium, neon, argon, krypton, and xenon . The use of this hazard symbol is optional.
	W	Unusual reactivity with water . This indicates a potential hazard using water to fight a fire involving this material. When a compound is both water-reactive and an oxidizer , the W/bar symbol should go in this quadrant and the OX warning is placed immediately below the NFPA diamond.

Some organizations use other symbols, abbreviations, and words in the white Special Hazards section. NFPA 704 permits the use of additional symbols, but they must be placed **outside** of the NFPA diamond. The following symbols are **not** compliant with NFPA 704, but we present them here in case you see them on an MSDS or container label.

ACID	This indicates that the material is an acid , a corrosive material that has a pH lower than 7.0
ALK	This denotes an alkaline material, also called a base . These caustic materials have a pH greater than 7.0
COR	This denotes a material that is corrosive (it could be either an acid or a base).
	This is another symbol used for corrosive .
	The skull and crossbones are used to denote a poison or highly toxic material. See also: CHIP Danger symbols .

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	The international symbol for radioactivity is used to denote radioactive hazards; radioactive materials are extremely hazardous when inhaled .
	Indicates an explosive material. This symbol is somewhat redundant because explosives are easily recognized by their Instability Rating .

<p>Safety Manual</p> <p>Pre-Task Hazard Plans</p>

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PRE-TASK HAZARD PLANS

1 Purpose and Scope:

- 1.1 A Pre-task Hazard plan is a safety planning tool which consists of a safety checklist and a job hazard analysis
- 1.2 Pre-task Hazard Plans are to be used when performing non-routine work which presents unusual risks or hazards to workers, public and/or property. This work may include but not limited to the following:
 - Confined Space Entry.
 - Critical Lifts.
 - Trenching / Excavating.
 - Line Breaking.
 - Equipment / Building Demo.
 - Elevated work or work which poses unique fall hazards.
 - Chemical Hazards.
- 1.3 Pre-task Hazard Plans are a supplemental planning tool and are not to be used in lieu of job specific permits, (E.g. LOTO Checklist, Crane Lift Checklist, Confined Space Permit, etc.)

2 Responsibility:

- 2.1 It is the responsibility of the supervisor to determine when a Pre-task Hazard Plan is to be used.
- 2.2 It is the supervisor's responsibility to develop the Pre-task Hazard Plan.
- 2.3 It is the responsibility of all employees to review and follow the requirements detailed in the Pre-task Hazard Plan.
- 2.4 It is the safety department's responsibility to train supervisors in the preparation of Pre-task Hazard Plans.

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3 Procedure:

- 3.1 Identify Project/Equipment/System Description.
- 3.2 Identify and obtain task specific work plans or permit.
- 3.3 Complete PPE, Fall Protection and Safe Plan of Action Checklist.
- 3.4 Break down job steps and complete Job Hazard Analysis.
 - 3.4.1 Conduct a walk-through of work area, inspecting for hazards.
 - 3.4.2 Write the steps of the task.
 - 3.4.3 Note possible hazards involved in each step as well as contingencies.
 - 3.4.4 In the Safe Plan column, provide the corrective actions that will be taken to mitigate the hazards.
 - 3.4.5 List tools needed to do the job, additional safety equipment, etc.
- 3.5 Review the Pre-task Hazard Plan with each team member and obtain signatures.
- 3.6 The supervisor is to sign the plan and forward to the Safety Department for review, if required.
- 3.7 **If conditions change, STOP the job, identify control measures, update the plan and communicate changes with team members.**

<p>Safety Manual</p> <p>Heat Related Illness Safety Program</p>

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Revision No.: 5

Effective: 09-05
Revision Date: 05-15
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HEAT RELATED ILLNESS SAFETY PROGRAM

1. Purpose:

- 1.1 To provide a safe and healthful working environment and protect Therma employees who are exposed to temperature extremes, radiant heat, humidity, or limited air movement while working from heat related illnesses.

2. Policy:

- 2.1 The workplace will be evaluated to determine if Therma employees are at high risk from heat related illnesses during temperature extremes and hot weather while working. If it is determined employees are at risk they will be Trained to be aware of the heat related illnesses, and procedures to take if symptoms are present.
- 2.2 This program shall be made available to all employees.
- 2.3 *Therma shall develop and maintain a Heat Illness Prevention Plan. The plan shall, at a minimum, consist of; procedures for the provision of water and access to shade; high heat procedures; emergency response procedures; acclimatization methods; training requirements. The plan shall be available to employees at the worksite, as well as to representatives of Cal/OSHA upon request. The plan will be considered available at the worksite if, it can be displayed for employees on a cell phone or other electronic device upon request.*

3. Implementation of Therma Heat Stress Program:

- 3.1 Therma will implement this Heat Stress Program when employees are at risk of heat related illnesses while they are working and are exposed to a combination of environmental risk factors such as temperature extremes, radiant heat, humidity, limited air movement, protective clothing, workload severity and duration.

4. Training:

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- 4.1 Training will be provided prior to job assignment.
- 4.2 Employee training: Training in the following topics will be provided to all supervisory and non-supervisory employees:
 - 4.2.1 Environmental and personal risk factors for heat illness.
 - 4.2.2 Procedures for identifying, evaluating, and controlling exposures to the environmental and personal risk factors for heat illness.
 - 4.2.3 The importance of frequent consumption of water.
 - 4.2.4 The *concept*, importance, and *method* of acclimatization.
 - 4.2.5 The different types of heat illness and the common signs and symptoms or signs of heat illness.
 - 4.2.6 The importance of immediately reporting to the employer or designee symptoms or signs of heat illness.
 - 4.2.7 Procedure for responding to symptoms of possible heat illness, including how emergency services will be provided should they become necessary.
 - 4.2.8 Procedure for contacting emergency medical services, and if necessary, for transporting employees to a point where they can be reached by medical service personnel.
 - 4.2.9 How to provide clear and precise directions to the work site.
 - 4.2.10 *Therma's responsibility to provide water, shade, cool-down rests, and access to first aid as well as the employees' right to exercise their rights without retaliation.*
- 4.3 Supervisor training: Prior to assignment to supervision of employees working in the heat, training on the following topics will occur:
 - 4.3.1 The information provided for employee training.
 - 4.3.2 Procedures the supervisor will follow to implement controls as determined by the employer.
 - 4.3.3 Procedures the supervisor will follow when an employee exhibits symptoms consistent with possible heat illness, including emergency response procedures.
- 4.4 *Training records shall be maintained for a period of no less than 3 years*

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5. Controls for reducing heat exposure:

- 5.1 Therma's supervisors will evaluate the potential for heat stress. If environmental conditions are present the supervisor will implement controls, such as; work/rest regimen, starting jobs earlier and ending earlier to avoid hot times of the day, and/or, provisions for gaining access to shade.
- 5.2 Acclimatization: Acclimatization means temporary adaptation of the body to work in the heat that occurs gradually when a person is exposed to it. Acclimatization peaks in most people within four to fourteen days of regular work for at least two hours per day in the heat. In fully acclimatized individuals, sweating starts faster and the sweat carries less salt and other minerals out of the body. As a result, by sweating more efficiently the body cools down faster. Also there is less demand on the heart and cardiovascular system. For the reasons given above, *being fully acclimatized can allow workers to continue working in warm or hot conditions and decreases the risk of heat illness and unsafe acts.*

In general, physically fit individuals become acclimatized about 50% faster than those individuals who are not physically fit. Overweight individuals may retain more body heat and therefore may be more prone to developing heat illness.

- 5.2.1 Methods to acclimatize employees who are working in hot environments:
- If they are not accustomed to working in warm or hot environments, they should start work slowly and pick up the pace gradually.
 - Assign employees to less physically demanding tasks during their first 14 days of working in a warm or hot environment.
 - Schedule and provide frequent breaks. Supply sufficient amounts of drinking water
 - *All employees shall be closely observed by a supervisor or designee during a heat wave. "Heat wave" means any day in which the predicted high temperature for the day will be at least 80 degrees Fahrenheit and at least ten degrees Fahrenheit higher than the average high daily temperature in the preceding five days*

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- *An employee who has been newly assigned to a high heat area shall be closely observed by a supervisor or designee for the first 14 days of the employee's employment*

6. Provisions for water:

- 6.1 An adequate supply of *fresh, pure, and clean* potable drinking water *shall be located as close as practicable to the areas where employees are working* and will be supplied to employees per safety standards. Employees will be notified of the location of potable water and encouraged to drink. Where it is not plumbed or otherwise continuously supplied, it shall be provided in sufficient quantity at the beginning of the work shift to provide one quart per employee per hour for drinking for the entire shift.

7. Access to Shade:

- 7.1 The company shall provide access to shade when the temperature exceeds 80 degrees. Shade can be in the form of “pop-ups”, umbrellas, or tree-covered areas. *Employees shall be allowed and encouraged to take a preventative cool down rest in the shade when they feel the need to do so to protect them from overheating.*
- 7.2 *An individual employee who takes a preventative cool-down rest (A) shall be monitored and asked if he or she is experiencing symptoms of heat illness; (B) shall be encouraged to remain in the shade; and (C) shall not be ordered back to work until any signs or symptoms of heat illness have abated. If an employee exhibits signs or reports symptoms of heat illness while taking a preventative cool-down rest, the employer shall provide appropriate first aid or emergency response.*
- 7.3 Access shall be permitted at all times.
- 7.4 Locate the shade structure as close as practicable to the areas where employees are working.
- 7.5 “Rule of Thumbs”: The amount of shade present should be at least enough to accommodate *the number of employees on recovery or rest periods. The amount of shade present during meal periods*

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shall be at least enough to accommodate the number of employees on the meal period who remain onsite.

8. High Heat Procedures:

8.1 In the event temperatures *equal or* exceed 95 degrees Fahrenheit, the following procedures shall be implemented:

- Ensure communication methods are available so employees can contact their supervisors when necessary.
- Supervisors shall observe employees for alertness and sign / symptoms of heat illness *by implementing one or more of the following:*
 - *Supervisor or designee observation of 20 or fewer employees, or*
 - *Mandatory buddy system, or*
 - *Regular communication with sole employee such as by radio or cellular phone, or*
 - *Other effective means of observation.*
- *Pre-shift meetings before the commencement of work to review the high heat procedures, encourage employees to drink plenty of water, and remind employees of their right to take a cool-down rest when necessary.*
- *Designating one or more employees on each worksite as authorized to call for emergency medical services, and allowing other employees to call for emergency services when no designated employee is available.*
- Reminding employees throughout the work shift to drink plenty of water.
- Closely supervise new employees for their first 14 days of employment.

9. First Aid awareness and actions in the event of a heat related illness:

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- 9.1 Procedures for contacting emergency responders for heat illness emergencies shall be established in the Site Medical Plan. This plan shall be posted and clearly communicated to employees prior to the start of work.
- 9.2 Remote Locations: The beginning of each day the supervisor shall evaluate his/her work site to determine if transportation from a remote location to a location where they could be reached by an emergency medical responder if an emergency occurs. These procedures shall be included in the Site Medical Plan.
- 9.3 The following chart helps employees recognize the main type of heat related illnesses, symptoms, and the appropriate treatment to reduce the effects of the heat related illness.

	Symptoms	Treatment
Heat Cramps	<ul style="list-style-type: none"> muscle spasms in legs or abdomen 	<ul style="list-style-type: none"> move person to a cooler location stretch muscles for cramps give cool water or electrolyte-containing fluid to drink
Heat exhaustion	<ul style="list-style-type: none"> headaches clumsiness dizziness/fainting weakness/exhaustion heavy sweating/clammy skin confusion rapid breathing rapid/weak pulse seizures 	<ul style="list-style-type: none"> move person to a cooler location (do not leave alone) loosen and remove heavy clothing that restricts evaporative cooling if conscious, provide small amounts of cool water to drink fan person, spray with cool water, or apply a wet cloth to skin to increase evaporative cooling call 911 if not feeling better within a few minutes

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Heat stroke	<ul style="list-style-type: none"> • sweating may or may not be present • red/flushed, hot dry skin • bizarre behavior • mental confusion or loss of consciousness • panting/rapid breathing • rapid/weak pulse • seizures 	<ul style="list-style-type: none"> • call 911 • move person to a cooler location (do not leave alone) • loosen and remove heavy clothing that restricts evaporative cooling • cool worker rapidly • fan person, spray with cool water, or apply a wet cloth to skin to increase evaporative cooling
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10. Definitions

- 10.1 “Heat Related Illness” – means a serious medical condition resulting for the body’s inability to cope with a particular heat load, and includes heat cramps, heat exhaustion, heat syncope (fainting) and heat stroke.
- 10.2 “Environmental risk factors for heat illness” – means working conditions that create the possibility that heat illness could occur, including air temperature, relative humidity, radiant heat from the sun and other sources, conductive heat sources such as ground, air movement, workload severity and duration, protective clothing and personal protective equipment worn by employees. These conditions will be considered when determining that Therma is implementing controls and methods to reduce the potential for heat related illness.
- 10.3 “Personal risk factors for heat illness” – means factors such as individual’s age, degree of acclimatization, health, water consumption, alcohol consumption, caffeine consumption, and use of prescription medications that affect the body’s water retention or other physiological responses to heat.
- 10.4 “Shade” – *means blockage of direct sunlight. One indicator that blockage is sufficient is when objects do not cast a shadow in the*

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area of blocked sunlight. Shade is not adequate when heat in the area of shade defeats the purpose of shade, which is to allow the body to cool. For example, a car sitting in the sun does not provide acceptable shade to a person inside it, unless the car is running with air conditioning. Shade may be provided by any natural or artificial means that does not expose employees to unsafe or unhealthy conditions and that does not deter or discourage access or use.

- 10.5 *“Heat wave” - Any day in which the predicted high temperature for the day will be at least 80 degrees Fahrenheit and at least ten degrees Fahrenheit higher than the average high daily temperature in the preceding five days*

Note: Italicized text added to comply with the HIP Regulation Amendments, March 23, 2015

Daily Supervisor Heat Illness Prevention Checklist

Job Site: _____ Today's Date: _____

Your designated HIP person for the job site is: _____

	YES	NO
1. Has the designated person received HIP training?	<input type="checkbox"/>	<input type="checkbox"/>
2. Do you have a readily available copy of Therma's HIPP (may be written or electronic)?	<input type="checkbox"/>	<input type="checkbox"/>
3. Have you reviewed the HIP with your employees?	<input type="checkbox"/>	<input type="checkbox"/>
4. *Have you evaluated the weather and determined to the possibility of high heat potential (+95 degrees)?	<input type="checkbox"/>	<input type="checkbox"/>
5. Do you have provisions for accessible, adequate (1 qt. per hr. per employee), fresh/cool water for your employees?	<input type="checkbox"/>	<input type="checkbox"/>
6. Have you encouraged your employees to drink water frequently, especially, during high heat?	<input type="checkbox"/>	<input type="checkbox"/>
7. Have you provided your employees with access to shade?	<input type="checkbox"/>	<input type="checkbox"/>
8. Have you encouraged your employees to take "cool down" breaks (min 5 minutes) if they feel they need to protect themselves from overheating?	<input type="checkbox"/>	<input type="checkbox"/>
9. Have you determined an effective method to contact emergency services if they are needed?	<input type="checkbox"/>	<input type="checkbox"/>

*High Heat Procedures (+95 degrees)

10. Is it possible to reschedule outdoor activities during non-high heat hours?	<input type="checkbox"/>	<input type="checkbox"/>
11. Do you and your employees have an effective method to communicate during the work shift?	<input type="checkbox"/>	<input type="checkbox"/>
12. Have they been encouraged to contact you if needed?	<input type="checkbox"/>	<input type="checkbox"/>
13. Do you have a method to actively monitor temperature (e.g. dry bulb thermometer) throughout the work shift?	<input type="checkbox"/>	<input type="checkbox"/>
14. Can you effectively observe your employees during the work shift? If not, have you implemented a "buddy system"?	<input type="checkbox"/>	<input type="checkbox"/>
15. Do you have newly assigned employees that will be closely monitored / work modified for the first 14 days of work?	<input type="checkbox"/>	<input type="checkbox"/>
16. Have you conducted a daily training briefing (prior to work) which covers weather forecast, frequent drinking of water, access to shade, signs/symptoms/treatment of heat illness, cool down breaks, communication, and contacting emergency services?	<input type="checkbox"/>	<input type="checkbox"/>
17. Have you designated a trained employee as the person responsible for responding to and providing treatment until emergency services arrive?	<input type="checkbox"/>	<input type="checkbox"/>

Daily Supervisor Heat Illness Prevention Checklist

Job Site: _____ **Today's Date:** _____

[illegible]

<p>Safety Manual</p> <p>Respiratory Protection Program</p>

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Revision No.: 2

Effective: 06-99
Revision Date: 01-09
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Respiratory Protection Program

1. Purpose and Scope:

- 1.1 The Occupational Safety and Health Administration (OSHA) General Industry standard for respiratory protection 29 CFR 1910.134 requires that a written respiratory protection program be established by an employer. The following procedures are based on the requirements established by OSHA.

2. Responsibilities:

2.1 Management:

- 2.1.1 It is management's responsibility to determine what specific applications require the use of respiratory protective equipment. Management must also provide proper respiratory protective equipment to meet the needs of each specific application. Employees must be provided with adequate training and instructions on all equipment.

2.2 Management/Supervisory:

- 2.2.1 Superintendents of each area are responsible for ensuring that all personnel under their control are completely knowledgeable of the respiratory protection requirements for the areas in which they work. They are also responsible for ensuring that their subordinates comply with all facets of this respiratory protection program, including respirator inspection and maintenance. They are responsible for implementing disciplinary procedures for employees who do not comply with respirator requirements.

2.3 Employees:

- 2.3.1 It is the responsibility of the employee to have an awareness of the respiratory protection requirements for their work areas (as explained by management). Employees are also responsible for wearing the appropriate respiratory protective equipment according to proper instructions and for maintaining the equipment in a clean and operable condition.

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2.4 Program Administration:

- 2.4.1. The following individual has total and complete responsibility for the administration of the respiratory protection program:

Name: Fred Mulgrew

Title: Construction Safety Manager

- 2.4.2. This individual has the authority to act on any and all matters relating to the operation and administration of the respiratory protection program. All employees, operating departments, and service departments will cooperate to the fullest extent. This person is referred to as the Respiratory Protection Program Administrator in this program.
- 2.4.3. This individual is responsible for monitoring or conducting an exposure assessment of the respiratory hazard, developing standard operating procedures for this program, maintaining records, and conducting program evaluations.
- 2.4.4. This individual is responsible for contaminant identification and measurement, including technical support, air sampling and laboratory analysis.
- 2.4.5. This individual is responsible for evaluating the health of the company employees via a comprehensive medical and health program.
- 2.4.6. This individual is responsible for directing and coordinating engineering projects that are directly related to respiratory protection.
- 2.4.7. This individual is responsible for selection, issuance, training, and fit testing of all respirators used in this company, including record keeping.

3. Policy:

- 3.1 It is the policy of this company to provide its employees with a safe and healthful work environment. The guidelines in this program are designed to help reduce employee exposure to occupational air contaminants and oxygen deficiency. The primary objective is to prevent excessive exposure to these contaminants. This is accomplished as far as feasible by accepted engineering and work practice control measures. When effective engineering controls are not feasible, or while they are being implemented or evaluated, respiratory protection may be required to

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achieve this goal. In these situations, respiratory protection is provided at no cost to the employees.

3.2 Medical Evaluation:

3.2.1 Every employee who is being considered for inclusion in the Respiratory Protection Program must participate in a medical evaluation. A determination of the employee's ability to wear a respirator while working is made initially before fit testing. Future evaluations are made when there is a change in workplace conditions or information indicating a need for reevaluation.

3.2.2 Medical evaluation prior to fit-testing will be confidential, during normal working hours, convenient, understandable, and the employee will be given a chance to discuss the results with the physician or other licensed health care professional (PLHCP).

3.3 Work Area Monitoring:

3.3.1. Exposure assessment will be done to ensure proper respirator selection. In order to determine the exposure level, air samples of the work-place representative of the work period, exposure assessment based on analogous processes, or professional judgment will be used. Personal sampling equipment may be used in accordance with accepted industrial hygiene standards to sample each work area. Results of these samples will pinpoint areas where respiratory protection is required.

3.3.2. Working in IDLH atmospheres is not allowed.

3.3.3. The exposure assessment will be performed prior to the task requiring respiratory protection. Periodically thereafter, as required by OSHA substance specific standards or at least every twelve (12) months, ** a review of the exposure assessment will be made to determine if respiratory protection is still required. If respiratory protection is still necessary, respirator selections will be reviewed to assure their continued suitability.

3.4 Respirator Selection:

3.4.1 Respirators are selected and approved for use by management. The selection is based upon the physical and chemical properties of the air contaminants and the concentration level likely to be encountered by the employee. The Respiratory

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Protection Program Administrator will make a respirator available immediately to each employee who is assigned to a job that requires respiratory protection. Replacement respirators/cartridges and filters will be made available as required.

3.4.2 The selection of the proper respirator type will be made following the procedures that are attached.

3.4.3 All respirators will be NIOSH approved.

3.5 Use of Respirators:

3.5.1 All tight-fitting respirators (both negative and positive pressures) shall not be used with beards or other facial hair or any other condition that prevents direct contact between the face and the edge of the respirator or interferes with valve function.

3.5.2 Employees will be required to leave the contaminated area:

- Upon malfunction of the respirator
- Upon detection of leakage of contaminant into the respirator.
- If increased breathing resistance of the respirator is noted.
- If severe discomfort in wearing the respirator is detected.
- Upon illness of the respirator wearer, including: sensation of dizziness, nausea, weakness, breathing difficulty, coughing, sneezing, vomiting, fever and chills.
- To wash face to prevent skin irritation
- To change filter/cartridge elements or replace respirators whenever they detect the warning properties of the contaminant or increased breathing resistance.

3.6 Respirator Training and Fitting:

3.6.1 Training:

- Employees assigned to jobs requiring respirators will be instructed by their supervisor relative to their responsibilities in the respiratory protection program. They will also be instructed in the need, use, limitations, and care of their respirator
- Retraining is given at least every 12 months ** after initial training.

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3.7 Fit Testing:

- 3.7.1 Employees will be properly fitted and tested for a face seal prior to use of the respirator in a contaminated area. Qualitative fit testing will be the preferred method of fit testing.
- 3.7.2 Fit testing will be done initially upon employee assignment to an area where respirators are required. Fit testing will be repeated at least every 12 months ** thereafter. All Tight-fitting respirators (negative and positive pressure) will be fit tested. Positive pressure tight-fitting respirators will be fit tested in the negative pressure mode.
- 3.7.3 Fit testing will not be done on employees with facial hair that passes between the respirator seal and the face or interferes with valve function. Such facial hair includes stubble, beards and long sideburns.
- 3.7.4 **Note:** If it is determined that an individual cannot obtain an adequate fit with any tight-fitting respirator, a loose fitting powered air purifying or supplied air respirator may be required instead.

3.8 Respirator Inspection, Maintenance and Storage:

- 3.8.1 Respirators must be properly maintained to retain their original effectiveness. The maintenance program will consist of periodic inspection, repair, cleaning and proper storage.
- 3.8.2 Inspection: The wearer of a respirator will inspect it daily whenever it is in use. The safety department will periodically spot respirators for fit, usage and condition. The use of defective respirators is not permitted. If a defective respirator is found during inspection, it must be returned to the safety department.
- 3.8.3 Repair: During cleaning and maintenance, respirators that do not pass inspection will be removed from service and will be discarded or repaired. Repair of the respirator must be done with parts designed for the respirator in accordance with the manufacturer's instructions before reuse. No attempt will be made to replace components or make adjustments, modifications or repairs beyond the manufacturer's recommendations.

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- 3.8.4 Cleaning: Respirators not discarded after one shift use, except filtering face-piece type, will be cleaned on a daily basis (or after each use if not used daily), according to the manufacturer's instructions, by the assigned employee or other person designated by the Respiratory Protection Program Administrator. Facilities and supplies for cleaning these respirators will be made available.
- 3.8.5 Storage: Respirators not discarded after one shift use will be stored in a location where they are protected from sunlight, dust, heat, cold, moisture and damaging chemicals. They shall be stored in a manner to prevent deformation of the face piece and exhalation valve. Whenever feasible, respirators not discarded after one shift use will be marked and stored in such a manner to assure that they will be worn only by the assigned employee. If use by more than one employee is required, the respirator will be cleaned between uses.
- 3.8.6 Compressed Air System: Special precautions will be taken to assure breathing quality air when an air line respirator of SCBA is to be used. This air will meet the specifications for Grade D Air established by the Compressed Gas Association as stated in Commodity Specification for Air (ASNSI/CGAG-7.1), 1989. Cylinders of purchased breathing air must have a certificate of analysis from the supplier that the air meets Grade D requirements. The moisture content in the cylinder must not exceed a dew point of -50°F at 1 atmosphere pressure. For air from compressors, the moisture content must be minimized so that the dew point at 1 atmosphere pressure is at least 10°F below the ambient temperature.
- 3.9 Program Evaluation:
- 3.9.1 The workplace will be reviewed and evaluated at least every 12 months (the program administrator can establish more frequent evaluations/assessments) to ensure that the written respiratory protection program is being properly implemented and to consult employees to ensure that they are using the respirators properly.
- 3.9.2 A written report will be made of each evaluation, summarizing the findings. For each deficiency identified, corrective action taken will be noted.

<p>Safety Manual</p> <p>Therma Fall Protection Program</p>

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Revision No.: 3

Effective: 06-99
Revision Date: 08-15
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Fall Protection Program

1. OBJECTIVE:

- 1.2 The objective of the **Therma's** Fall Protection Program is to identify and evaluate fall hazards to which employees will be exposed, and to provide specific training as required by the Occupational Safety and Health Administration (OSHA) Fall Protection Standard, 29 CFR 1926, Subpart M.

2. POLICY:

- 2.1 It is the policy of **Therma's** to protect its employees from occupational injuries by implementing and enforcing safe work practices and appointing a competent person(s) to manage the Fall Protection Program. The **Therma** Fall Protection Program shall comply with the OSHA requirements. A copy of the OSHA Fall Protection Standard shall be made available to all employees, and may be obtained from the **Safety Department.**
- 2.2 Fall Protection is required when ever employees are exposed to any fall from heights of (6) six feet or greater to lower levels. This includes work near and around excavations.

3. ASSIGNMENT OF RESPONSIBILITY:

3.1 **Employer:**

- 3.1.1 It is the responsibility of **Therma** to provide fall protection to affected employees, and to ensure that all employees understand and adhere to the procedures of this plan.

3.2 **Program Manager:**

- 3.2.1 The Safety Department Manager is responsible for implementation of the Fall Protection Program.

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3.2.2 The Safety Department Manager or his/her designated representative is responsible for the following:

- a. Performing routine safety checks of work operations.
- b. Enforcing **Therma** safety policy and procedures.
- c. Correcting any unsafe practices or conditions immediately.
- d. Training employees and supervisors in recognizing fall hazards and the use of fall protection systems.
- e. Maintaining records of employee training, equipment issue, and fall protection systems used at **Therma** jobsites.
- f. Investigating and documenting all incidents that result in employee injury.

3.2.3 The **EH & S Manager** and/or his/her representative shall be adequately trained in Fall Protection Systems use, care and inspection.

3.3 Supervisors:

3.3.1 It is the responsibility of all supervisors to:

- a. Inspect jobsites daily for fall hazards.
- b. Ensure field compliance with the written program.
- c. Enforcement of program requirements.
- d. Ensuring employees are working in a safe manner when exposed to any and all fall hazards.

3.4 **Employees:**

3.4.1 It is the responsibility of all employees to:

- a. Understand and adhere to the procedures outlined in this Fall Protection Program.
- b. Bring to management's attention any unsafe or hazardous conditions or practices that may cause injury to either themselves or any other employees.
- c. Report any incident that causes injury to an employee, regardless of the nature of the injury.

4. TRAINING:

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- 4.1 All employees who may be exposed to fall hazards are required to receive training on how to recognize such hazards, and how to minimize their exposure to them. Employees shall receive training as soon after employment as possible, and before they are required to work in areas where fall hazards exist.
- 4.2 A record of employees who have received training and training dates shall be maintained by the **Safety Department**. Training of employees by the **Safety Department** shall include:
 - 4.2.1 Nature of the fall hazards employees may be exposed to.
 - 4.2.2 Correct procedures for erecting, maintaining, disassembling, and inspecting fall protection systems.
 - 4.2.3 Use and operation of controlled access zones, guardrails, personal fall arrest systems, safety nets, warning lines, and safety monitoring systems.
 - 4.2.4 Role of each employee in the Safety Monitoring System (if one is used).
 - 4.2.5 Correct procedures for equipment, materials handling, storage, and erection of overhead protection.
 - 4.2.6 Role of each employee in alternative Fall Protection Plans (if used).
 - 4.2.7 Requirements of the OSHA Fall Protection Standard, 29 CFR 1926, Subpart M.
 - 4.2.8 **Therma's** requirements for reporting incidents that cause injury to an employee.
- 4.3 Additional training shall be provided on an annual basis, or as needed when changes are made to this Fall Protection Program, an alternative Fall Protection Plan, or the OSHA Fall Protection Standard.
- 4.4 Retraining of the employee shall be conducted when:
 - 4.4.1 Deficiencies in the original training has been noted, changes in the work places occur, and/or, fall protection systems or equipment change that render previous training obsolete.
- 4.5 Fall protection training documentation shall include:
 - 4.5.1 Who was trained, training dates and instructor signature.

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- 4.6 Training certification(s) expire after (3) years from the original training date.

5 CONTROLLED ACCESS ZONES:

- 5.1 **Therma employees** are prohibited from entering controlled access zones.
- 5.2 Controlled access zones shall be defined by control lines consisting of ropes, wires, tapes, or equivalent material with supporting stanchions, and shall be:
- 5.3.1 Flagged with a high-visibility material at six (6) foot intervals.
 - 5.3.2 Rigged and supported so that the line is between 30 and 50 inches (including sag) from the walking / working surface.
 - 5.3.3 Strong enough to sustain stress of at least 200 pounds.
 - 5.3.4 Extended along the entire length of an unprotected or leading edge.
 - 5.3.5 Parallel to the unprotected or leading edge.
 - 5.3.6 Connected on each side to a guardrail system or wall.
 - 5.3.7 Erected between six (6) feet and 25 feet from an unprotected edge, except in the following cases:
 - a. When working with precast concrete members, between six (6) feet and 60 feet from the leading edge, or half the length of the member being erected, whichever is less.
 - b. When performing overhand bricking or related work, between ten (10) feet and 15 feet from the working edge.

6. EXCAVATIONS:

- 6.1 Fall protection will be provided to employees working at the edge of an excavation that is six (6) feet or deeper. Employees in these areas are required to use the fall protection systems as designated in this program.
- 6.1.1 Excavations that are six (6) feet or deeper shall be protected by guardrail systems, fences, barricades, or covers.
 - 6.1.2 Walkways that allow employees to cross over an excavation that is six (6) feet or deeper shall be equipped with guardrails.

7. FALL PROTECTION SYSTEMS:

7.1 Covers:

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- 7.1.1 All covers shall be secured to prevent accidental displacement.
- 7.1.2 Covers shall be color-coded or bear the markings “HOLE” or “COVER”.
- 7.1.3 Covers located in roadways shall be able to support twice the axle load of the largest vehicle that might cross them.
- 7.1.4 Covers shall be able to support twice the weight of employees, equipment, and materials that might cross them.

7.2 Guardrail Systems:

- 7.2.1 Guardrail systems shall be erected at unprotected edges, ramps, runways, or holes where it is determined that erecting such systems will not cause an increased hazard to employees. The following specifications will be followed in the erection of guardrail systems. Toprails shall be:
 - a. At least ¼ inch in diameter (steel or plastic banding is unacceptable).
 - b. Flagged every six (6) feet or less with a high visibility material if wire rope is used.
 - c. Forty-two (42) inches (plus or minus three (3) inches) above the walking/working level.
 - d. Adjusted to accommodate the height of stilts, if they are in use.
- 7.2.2 Midrails, screens, mesh, intermediate vertical members, and solid panels shall be erected in accordance with the OSHA Fall Protection Standard.
- 7.2.3 Gates or removable guardrail sections shall be placed across openings of hoisting areas or holes when they are not in use to prevent access.

7.3 Personal Fall Arrest Systems:

- 7.3.1 Personal fall arrest systems shall be issued to and used by employees and may consist of an ANSI certified full-body

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harness, anchorage, connectors, deceleration device, lifeline, or suitable combinations. Personal fall arrest systems shall:

- a. Limit the maximum arresting force to 1800 pounds.
- b. Be rigged so an employee cannot free fall more than six (6) feet or contact any lower level and, where practicable, the anchor end of the lanyard shall be secured at a level not lower than the employee's waist.
- c. Bring an employee to a complete stop and limit the maximum deceleration distance traveled to three and a half (3 ½) feet.
- d. Be strong enough to withstand twice the potential impact energy of an employee free falling six (6) feet (or the free fall distance permitted by the system, whichever is less).
- e. Be inspected prior to each use for damage and deterioration.
- f. Be removed from service if any damaged components are detected.

7.3.2 All components of a fall arrest system including descent control, and rescue equipment shall meet the specifications of the OSHA Fall Protection Standard, and shall be used in accordance with the manufacturer's recommendations.

- a. The use of non-locking snaphooks is prohibited.
- b. Dee-rings and locking snaphooks shall:
 1. Have a minimum tensile strength of 5000 pounds.
 2. Be proof-tested to a minimum tensile load of 3600 pounds without cracking, breaking, or suffering permanent deformation.
- c. Lifelines shall be:
 1. Designed, installed, and used under the supervision of the **Safety Department**:
 2. Protected against cuts and abrasions.
 3. Equipped with horizontal lifeline connection devices capable of locking in both directions on the lifeline when used on suspended scaffolds or similar

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work platforms that have horizontal lifelines that may become vertical lifelines.

- d. Self-retracting lifelines and lanyards must have ropes and straps (webbing) made of synthetic fibers, and shall:
 - 1. Sustain a minimum tensile load of 3600 pounds if they automatically limit free fall distance to two (2) feet.
 - 2. Sustain a minimum tensile load of 5000 pounds (includes ripstitch, tearing, and deforming lanyards).
- e. Anchorages must support at least 5000 pounds per person attached and shall be:
 - 1. Capable of supporting twice the weight expected to be imposed on it.
 - 2. Independent of any anchorage used to support or suspend platforms.

7.4 Positioning Device Systems:

- 7.4.1 Body belt or body harness systems shall be set up so that an employee can free fall no farther than two (2) feet, and shall be secured to an anchorage capable of supporting twice the potential impact load or 3000 pounds, whichever is greater. Requirements for snaphooks, dee-rings, and other connectors are the same as detailed in this Program under ***Personal Fall Arrest Systems***.

7.5 Safety Monitoring Systems:

- 7.5.1 In situations when no other fall protection can be implemented, the safety monitor shall be appointed to monitor the activities of employees in the hazard area. The safety monitor shall be:
 - a. Competent in the recognition of fall hazards.
 - b. Capable of warning workers of fall hazard dangers.
 - c. Operating on the same walking / working surfaces as the employees and able to see them.
 - d. Close enough to work operations to communicate orally with employees.

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- e. Free of other job duties that might distract them from the monitoring function.

7.5.2 No employees other than those engaged in the work being performed under the Safety Monitoring System shall be allowed in the area. All employees under a Safety Monitoring System are required to promptly comply with the fall hazard warnings of the **EH & S Manager**.

7.6 Safety Net Systems:

- 7.6.1 Safety net systems must be installed no more than 30 feet below the walking / working surface with sufficient clearance to prevent contact with the surface below, and shall be installed with sufficient vertical and horizontal distances as described in the OSHA Fall Protection Standard.
- 7.6.2 All nets shall be inspected at least once a week for wear, damage, or deterioration by a competent person. Defective nets shall be removed from use and replaced with acceptable nets.
- 7.6.3 All nets shall be in compliance with mesh, mesh crossing, border rope, and connection specifications as described in the OSHA Fall Protection Standard.
- 7.6.4 When nets are used on bridges, the potential fall area from the walking / working surface shall remain unobstructed.
- 7.6.5 Objects that have fallen into safety nets shall be removed as soon as possible and at least before the next working shift.

7.7 Warning Line Systems:

- 7.7.1 Warning line systems consisting of supporting stanchions and ropes, wires, or chains shall be erected around all sides of roof work areas.
- 7.7.2 Lines shall be flagged at no more than six (6) foot intervals with high-visibility materials.
- 7.7.3 The lowest point of the line (including sag) shall be between 34 and 39 inches from the walking / working surface.
- 7.7.4 Stanchions of warning line systems shall be capable of resisting at least 16 pounds of force.
- 7.7.5 Ropes, wires, or chains must have a minimum tensile strength of 500 pounds.

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- 7.7.6 Warning line systems shall be erected at least six (6) feet from the edge, except in areas where mechanical equipment is in use. When mechanical equipment is in use, warning line systems shall be erected at least six (6) feet from the parallel edge, and at least ten (10) feet from the perpendicular edge.

8 TASKS AND WORK AREAS REQUIRING FALL PROTECTION:

- 8.1 Unless otherwise specified, **Safety Department** shall evaluate the worksite(s) and determine the specific type(s) of fall protection to be used in the following situations.

8.1.1 Framework and Reinforcing Steel:

- a. Fall protection will be provided when an employee is climbing or moving at a height of over 24 feet when working with rebar assemblies.

8.1.2 Hoist Areas:

- a. Guardrail systems or personal fall arrest systems will be used in hoist areas when an employee may fall six (6) feet or more. If guardrail systems must be removed for hoisting, employees are required to use personal fall arrest systems.

8.1.3 Holes:

- a. Covers or guardrail systems shall be erected around holes.

8.1.4 Leading Edges:

- a. Guardrail systems, safety net systems, or personal fall arrest systems shall be used when employees are constructing a leading edge that is six (6) feet or more above lower levels. An alternative Fall Protection Plan shall be used if the **Safety Department** determines that the implementation of conventional fall protection systems is infeasible or creates a greater hazard to employees. All alternative Fall Protection Plans for work on leading edges shall:

1. Be written specific to the particular jobsite needs.

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2. Include explanation of how conventional fall protection is infeasible or creates a greater hazard to employees.
3. Explain what alternative fall protection will be used for each task.
4. Be maintained in writing at the jobsite.
5. Meet the requirements of 29 CFR 1926.502(k).

8.1.5 Steep Roofs:

- a. Guardrail systems with toeboards, safety net systems, or personal fall arrest systems will be provided to employees working on a steep roof with unprotected sides and edges six (6) feet or more above lower levels.

8.1.6 Wall Openings:

- a. Guardrail systems, safety net systems, or a personal fall arrest system will be provided to employees working on, at, above or near wall openings when the outside bottom edge of the wall opening is six (6) feet or more than 39 inches above the walking / working surface.

8.1.7 Runways, and Other Walkways:

- a. Employees using ramps, runways, and other walkways six (6) feet or more above the lower level shall be protected by guardrail systems.

9. PROTECTION FROM FALLING OBJECTS:

- 9.1 When guardrail systems are in use, the openings shall be small enough to prevent potential passage of falling objects. The following procedures must be followed by all employees to prevent hazards associated with falling objects.
 - 9.1.1 No materials (except masonry and mortar) shall be stored within four (4) feet of working edges.
 - 9.1.2 Excess debris shall be removed regularly to keep work areas clear.
 - 9.1.3 Stacked materials must be stable and self-supporting.
 - 9.1.4 Canopies shall be strong enough to prevent penetration by falling objects.

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9.1.5 Toeboards erected along the edges of overhead walking / working surfaces shall be:

- a. Capable of withstanding a force of at least 50 pounds; and solid with a minimum of three and a half (3 ½) inches tall and no more than one quarter (1/4) inch clearance above the walking /working surface.

9.2 Equipment shall not be piled higher than the toeboard unless sufficient paneling or screening has been erected above the toeboard.

10. RESCUE:

10.1 A rescue plan shall be developed when employees are exposed to fall hazards and the possibility exists for the deployment personal fall arrest systems. Prompt rescue is critical in order to minimize the risk of serious injury to fallen personnel.

10.1.1 Employees shall be instructed in the methods self rescue. These methods may include:

- a. Rescues from ladder.
- b. Rescues from scissor lift.
- c. Rescues from boom lift.

10.1.2 The rescue plan shall also include the method to summons external emergency medical services for assistance in the event self rescue is not effective or appropriate should the employee become injured during the fall.

11. ACCIDENT INVESTIGATIONS:

11.1 All incidents that result in injury to workers, as well as near misses, regardless of their nature, shall be reported and investigated. Investigations shall be conducted by the **EH & S Manager** as soon after an incident as possible to identify the cause and means of prevention to eliminate the risk of reoccurrence.

11.2 In the event of such an incident, the Fall Protection Program (and alternative Fall Protection Plans, if in place) shall be re-evaluated by the **EH & S Manager** to determine if additional practices, procedures, or training are necessary to prevent similar future incidents.

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12. CHANGES TO THE PLAN:

- 12.1 Any changes to the Fall Protection Program (and alternative Fall Protection Plans, if in place) shall be approved by the **EH & S Manager**, and shall be reviewed by a qualified person as the job progresses to determine additional practices, procedures or training needs necessary to prevent fall injuries. Affected employees shall be notified of all procedure changes, and trained if necessary. A copy of this plan, and any additional alternative Fall Protection Plans, shall be maintained at the jobsite.

13. GLOSSARY:

- 13.1 **Anchorage**: a secure point of attachment for lifelines, lanyards, or deceleration devices.
- 13.2 **Body belt**: a strap with means both for securing it about the waist and for attaching it to a lanyard, lifeline, or deceleration device.
- 13.3 **Body harness**: straps that may be secured about the person in a manner that distributes the fall-arrest forces over at least the thighs, pelvis, waist, chest, and shoulders with a means for attaching the harness to other components of a personal fall arrest system.
- 13.4 **Connector**: A device that is used to couple (connect) parts of a personal fall arrest system or positioning device system together.
- 13.5 **Controlled access zone**: a work area designated and clearly marked in which certain types of work (such as overhand bricklaying) may take place without the use of conventional fall protection systems (guardrail, personal arrest, or safety net) to protect the employees working in the zone.
- 13.6 **Deceleration device**: any mechanism, such as a rope, grab, ripstitch lanyard, specially-woven lanyard, tearing lanyard, deforming lanyard, or automatic self-retracting lifeline/lanyard, which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limits the energy imposed on an employee during fall arrest.
- 13.7 **Deceleration distance**: the additional vertical distance a falling person travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which a deceleration device begins to operate.
- 13.8 **Guardrail system**: a barrier erected to prevent employees from falling to lower levels.
- 13.9 **Hole**: a void or gap two (2) inches (5.1 centimeters) or more in the least dimension in a floor, roof, or other walking/working surface.
- 13.10 **Lanyard**: a flexible line of rope, wire rope, or strap that generally has a connector at each end for connecting the body belt or body harness to a

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deceleration device, lifeline, or anchorage.

- 13.11 Leading edge:** the edge of a floor, roof, or formwork for a floor or other walking/ working surface (such as a deck) which changes location as additional floor, roof, decking, or formwork sections are placed, formed, or constructed.
- 13.12 Lifeline:** a component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), that serves as a means for connecting other components of a personal fall arrest system to an anchorage.
- 13.13 Low slope roof:** a roof having a slope less than or equal to 4 in 12 (vertical to horizontal).
- 13.14 Opening:** a gap or void 30 inches (76 centimeters) or more high and 18 inches (46 centimeters) or more wide, in a wall or partition through which employees can fall to a lower level.
- 13.15 Personal fall arrest system:** a system including but not limited to an anchorage, connectors, and a body harness used to arrest an employee in a fall from a working level.
- 13.16 Positioning device system:** a body belt or body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning backwards.
- 13.17 Rope grab:** a deceleration device that travels on a lifeline and automatically, by friction, engages the lifeline and locks to arrest a fall.
- 13.18 Safety monitoring system:** a safety system in which a competent person is responsible for recognizing and warning employees of fall hazards.
- 13.19 Self-retracting lifeline/lanyard:** a deceleration device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under minimal tension during normal employee movement and which, after onset of fall, automatically locks the drum and arrests the fall.
- 13.20 Snaphook:** a connector consisting of a hook-shaped member with a normally closed keeper, or a similar arrangement, which may be opened to permit the hook to receive an object and, when released automatically, closes to retain the object.
- 13.21 Steep roof:** a roof having a slope greater than 4 in 12 (vertical to horizontal).
- 13.22 Toeboard:** a low protective barrier that prevents material and equipment from falling to lower levels and which protects personnel from falling.
- 13.23 Unprotected sides and edges:** any side or edge (except at entrances to points of access) of a walking / working surface (e.g., floor, roof, ramp, or runway) where there is no wall or guardrail system at least 39 inches (1 meter) high.

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- 13.24 Walking/working surface:** any surface, whether horizontal or vertical, on which an employee walks or works, including but not limited to floors, roofs, ramps, bridges, runways, formwork, and concrete reinforcing steel. Does not include ladders, vehicles, or trailers on which employees must be located to perform their work duties.
- 13.25 Warning line system:** a barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge and which designates an area in which roofing work may take place without the use of guardrail, body belt, or safety net systems to protect employees in the area.

Safety Manual Ladder Safety Program

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Revision No.: 3

Effective: 06-99
Revision Date: 01-16
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Ladder Safety Program

1 Purpose and Scope:

- 1.1 The purpose and scope of this document is to put forth the regulations regarding Ladder Safety procedures and training at Therma. CFR 1926. 1950-1960 Subpart X contains specific information on these rules. All employees who might be expected to use a ladder during the course of work should be familiar with this document. This policy covers all types of ladders, including step, extension, and fixed ladders. Ladder users must be able to recognize and avoid ladder hazards and be aware of safe practices in setting up, storing, moving and working from this equipment.

2 Responsibility:

- 2.1 It is the responsibility of all Supervisors to assure that all employees that may use a ladder read and understand this document. This document is included in new hire orientation training material.
- 2.2 It is the responsibility of all Supervisors to provide basic ladder training safety information to those employees who have not been previously trained.
- 2.3 It is the responsibility of all Supervisors to assure that all ladders being used at Therma are free from defects and all moving parts are working properly.
- 2.4 It is the responsibility of all Safety Department to maintain records on ladder training.

3 Policy:

- 3.1 Only Class 1A (rated 300 pounds) fiberglass step and extension ladders shall be used.
- 3.2 All Therma employees who use ladders shall have Ladder Safety Training during New Employee Orientation.

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- 3.3 Ladder Safety Training will consist of recognition of possible hazards associated with ladder use, inspection, proper maintenance and safety precautions to be taken when using ladders.
- 3.4 Ladders shall only be used for the purpose in which they were designed.
- 3.5 Ladders shall be inspected by the Tool Room before dispatched to the field.
- 3.6 All employees who use ladders at Therma must inspect them for defects or possible hazards before the ladders are used. Ladders must be maintained free of grease, oil, and other slipping hazards. Ladders with loose parts or faulty rungs should be taken out of service immediately.
- 3.7 Ladders shall be inspected on an annual basis by the company's designated "competent" person.
- 3.8 Ladders that are taken out of service should be tagged "Defective" and removed from the work area and sent to the Tool Room for repair or disposal.
- 3.9 In the event a ladder is involved in an incident that may affect safe operation, it shall be immediately removed from service and sent to the tool room for inspection. Only after it has been inspected by the company's competent person shall it be placed back into service.
- 3.10 Therma employees shall only work from step ladders, extension ladders and fixed ladders that are vendor supplied. Job-made ladders are not approved for use. Ladders rungs, cleats, and steps shall be uniformly spaced when the ladder is in position for use.
- 3.11 Safety Ladder Setup:
 - 3.11.1 Inspect ladders for defects. Ensure the ladder is rated for the intended use.
 - 3.11.2 Ensure the ladder shall not be loaded beyond its rated weight capacity.
 - 3.11.3 All ladders must be placed on a stable level surface.
 - 3.11.4 Do not set ladders on boxes, blocks or other objects that might move.
 - 3.11.5 Do not lean or reach out while standing on ladders.
 - 3.11.6 Secure ladders whenever a danger of slippage might occur.

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- 3.11.7 Do not use ladders in high wind or during inclement weather conditions.
- 3.11.8 Never set up ladders in front of or around doors, unless the door is posted or locked.
- 3.11.9 Do not sit on ladders.
- 3.11.10 Use safety boots when climbing a ladder.
- 3.12 Climbing and Standing on Ladders Safely:
 - 3.12.1 Always face a ladder when climbing up or down.
 - 3.12.2 Do not carrying materials or tools when climbing a ladder. Climb the ladder first then pull up the materials with a rope. Maintain “3-point contact” rule.
 - 3.12.3 Rungs and steps should be clear of grease, oil, wet paint, snow, and ice before climbing.
 - 3.12.4 Do not climb onto a ladder from the side.
 - 3.12.5 Do not slide down a ladder.
 - 3.12.6 Climb or stand on a ladder with your feet in the center of the rung.
 - 3.12.7 Do not stand on the top two rungs or top of a stepladder.
- 3.13 Proper Use and Care of Ladders:
 - 3.13.1 Never use metal ladders near exposed electrical wires.
 - 3.13.2 Place warning signs or setup barriers around a ladder before use.
 - 3.13.3 Do not move a ladder while someone is on it.
 - 3.13.4 Never use a ladder when under the influence of alcohol or prescription medications.
 - 3.13.5 Do not leave tools or materials on top of ladders.
 - 3.13.6 Only one person should be on a ladder at a time.
 - 3.13.7 Do not use a ladder on a scaffold.
 - 3.13.8 Do not try to rock a ladder to move it.
 - 3.13.9 Store wood ladders where they will not be exposed to the elements.
 - 3.13.10 Make sure ladders are properly secured when transported.
 - 3.13.11 Do not paint ladders. Painting could hide potentially dangerous defects.
 - 3.13.12 Remove defective ladders from service.
- 3.14 Step Ladder Safety:
 - 3.14.1 Never use a stepladder over 20 feet in length.
 - 3.14.2 Always open a stepladder completely and make sure the spreader is locked before use.

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- 3.14.3 Do not stand higher than the second step from the top of a step ladder.
- 3.14.4 Do not straddle a stepladder.
- 3.15 Extension Ladder Safety:
 - 3.15.1 The sections of an extension ladder should overlap enough to retain the strength of the ladder.
 - 3.15.2 Never splice or tie two short ladders together.
 - 3.15.3 When using a ladder for access to a landing, it must extend 3 rungs or 3 feet above the landing. If the ladder can not be extended above the landing surface, it shall be secured at its top to a rigid support that will not deflect.
 - 3.15.4 To establish the proper climbing angle, use the 4:1 ratio. For every 4' of vertical height, the ladder based shall be 1' from the face of the building (climbing surface).
 - 3.15.5 The top of an extension ladder should rest against a flat, firm surface.
 - 3.15.6 Elevate and extend these extension ladders only from the ground.
 - 3.15.7 When practical, secure extension ladders at both the base and the top.
- 3.16 Extension Ladder Setup:
 - 3.16.1 Inspect the area for overhead obstruction. Be sure there are no electrical wires present.
 - 3.16.2 Lay the ladder on the ground when it is collapsed.
 - 3.16.3 Have someone foot the ladder or make sure it is braced against something.
 - 3.16.4 Pick up the ladder and walk it to an upright position, making sure it will not be obstructed by trees or wires.
 - 3.16.5 Slide the bottom of the ladder outwards to the proper angle and set the feet correctly.
 - 3.16.6 Then extend the ladder by pulling the extension line.
 - 3.16.7 Make sure the rungs on the upper half of the ladder are properly secured by the locking mechanism.
 - 3.16.8 Secure the rungs from the fly section to the rungs of the bed section with the lanyard or separate rope prior to climbing.
 - 3.16.9 Tie the ladder off or have someone steady the ladder as you climb it.

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3.17 Fixed Ladder Safety:

- 3.17.1 Fixed ladders must be secured to the object they are attached to.
- 3.17.2 Fixed ladders over 20 feet must have a safety cage surrounding the ladder.
- 3.17.3 The safety cage should have 15" clearance to all points from the center.
- 3.17.4 Defects in fixed ladders should be repaired as soon as possible.
- 3.17.5 When a defect is not repairable the ladder must be taken out of service.

THERMA FORKLIFT SAFETY TRAINING



OUR PRIORITIES:

- 1. SAFETY**
- 2. QUALITY**
- 3. SCHEDULE**

“No job is so important that it may be performed without regard for safety, health and the environment.”

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SAFETY, A THERMA WAY OF LIFE:

As with all job functions at THERMA, equipment operation is an important part of the service we provide to our customers. Because the operation of powered

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industrial fork lift equipment is inherently dangerous, it's important to be sure that safety is first and foremost in our minds any time we climb onto a piece of machinery.

DANGEROUS AT ANY SPEED:

Operating equipment in an unsafe manner is one of the major causes of injury and death in the construction industry. Fork lift machines account for a large number of these accidents.

1. SAFETY, 2. QUALITY, 3. SCHEDULE:

In our business our customers expect, and should receive, only the *best, most professional* work available. The safest possible methods and professionalism go hand in hand. A professional that knows how to operate a fork lift safely also knows that the **safe** operation of any piece of equipment is also the **fastest**, most professional way to work. Unsafe operations and short cuts are a sure way to increase accidents, injuries, and costs on a job. A remarkable thing occurs when safety is thought of **first**. The job is always of the best quality and is completed in the fastest, most economical way!

SAFETY IS JOB #1:

The long-standing commitment of THERMA to safety extends to certification of operators of fork lift equipment. THERMA personnel must realize that as leaders in our industry, it's imperative that we continue to lead in the field of safety.

PERSONNAL COMMITMENT:

The commitment of THERMA to safety is meaningless unless each individual is at least equal in his or her commitment. As an equipment operator you are one of the most highly visible people on any job site. Others on the job will look to you as an example of how safe or unsafe a company is. When others see you operating safely they will know that you are a professional, working for a professional company.

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1. **RESPONSIBILITIES:** Responsibilities for the safe operation of these machines lie in three categories:

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- **Manufacturer.**
- **Employer.**
- **Operator.**

- 1.1 Manufacturer:** The manufacturer is required to produce a machine that meets all safety rules and regulations. The **dealer** provides a machine that is safe to operate and meets all laws, rules and regulations.
- 1.2 Employer:** The employer provides the safest possible work site, enforces the rules and regulations covering the site and the type of work done, and makes sure that all personnel are trained for the type of work they are performing, including the operation of equipment.
- 1.3 Operator:** The operator is responsible for the operating condition of the equipment, and insures that the operation of the equipment will not endanger personnel on and around the equipment. Before the operator uses an unfamiliar machine for the first time, he/she will read and understand the operator's manual. The operator is responsible for a pre-operation inspection of his/her equipment and the work site. When confronted with an unsafe condition or the unsafe actions of personnel on or around the equipment, the operator is to cease operations at once, and only resume when the unsafe conditions or actions are corrected.

It is a violation of company policy for any employee to operate equipment they are not certified for!

2. **TYPES OF MACHINES:** There are several different types of **powered industrial fork lifts** designed to lift materials to different work heights. These are:

- **STANDARD FORK LIFT.**
- **"GRADALL" LIFT.**
- **SPECIALIZED LIFT.**

- 2.1 STANDARD FORK LIFT.** This machine is the one we visualize when we think of a fork lift. It has several distinctive characteristics:

- 2.1.1** Tilt-able mast assembly with lifting forks.
- 2.1.2** Four wheel design.
- 2.1.3** Rear wheel steering.
- 2.1.4** Driver Overhead Protection Service (OPS).
- 2.1.5** Automobile-like controls.
- 2.1.6** Conventional operator seating position.

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2.1.7 Smooth, hard wheels, designed for hard surface operation.

2.2 **“GRADALL”-TYPE FORK LIFT.** This machine differs from the standard fork lift machines in that:

2.2.1 The Boom that supports the lifting forks allows the material handling portion of the lift to extend beyond the support chassis.

2.2.2 The forks will reach over obstructions on the working surface.

2.2.3 It has a sophisticated suspension system that allows operation on uneven ground.

2.3 **SPECIALIZED FORK LIFT.** These machines are very similar to the standard lift truck with these additional features:

2.3.1 They have specialized attachments for handling specific types of materials (rolled steel, pipe, barrels, etc).

2.3.2 They have characteristics that allow them to operate in unique environments (cold storage, explosive atmospheres, etc).

2.3.3 The driver position is different from the conventional seated position on standard trucks (the operator may stand or even raise up with the work platform).

2.4 **SIMILARITIES.** Because the basic safe operating characteristics of these machines are the same, they will be combined for the purposes of this training:

2.4.1 **STANDARD FORK LIFTS** and **SPECIALIZED FORK LIFTS** will be referred to as fork lifts.

2.4.2 **“GRADALL”-TYPE LIFTS** will be called gradalls.

3. **INSPECTIONS.** Prior to operating one of these machines **2 inspections** must first be conducted: **JOB SITE AND EQUIPMENT.**

3.1 **JOB SITE.** This inspection should take place at the **beginning of each shift**, or more often if conditions change during a shift. Operators should look for any object or condition, which will inhibit the **safe operation** of his/her machine. These include:

3.1.1 **Housekeeping.** The job site shall be reasonably clear of **trash** and **debris**.

3.1.2 **Holes/Trenches.** Any **openings** in the floor should be covered with bridge material capable of supporting 4 times the anticipated weight that may pass over it. When openings are not covered, the operator may not approach closer than 18” to the edge of the opening.

3.1.3 **Floors.** Inspect for bumps, obstructions, and uneven conditions that **could effect** the machine.

3.1.4 **Lighting.** The operator should be able to see well enough to **safely operate** his machine. OSHA Regulations State that the

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minimum general lighting acceptable on construction sites is 5 foot candles. This is not much light to operate by, therefore extreme caution is needed under these conditions. "Task", or work lighting is provided by THERMA and will be sufficient for the type of work performed.

- 3.1.5 **Weather.** Wet floors, high wind and other weather related conditions can be very **hazardous**. Always check for these conditions before operating a lift.
- 3.1.6 **Overhead obstructions.** Never move a lift when there is danger of striking an **overhead obstruction**. This can cause the machine to turn over, and/or can cause damage to the object being struck.
- 3.1.7 **High voltage lines.** The minimum clearance for high voltage lines of 50 kilovolts is 10'. Make sure you have **clearance** around all electrical lines while operating.
- 3.1.8 **Foot traffic.** Watch for people **at all times**. On some machines the driver can't see people if they are directly behind them or are obscured with a large load. Shouted warnings such as, "Coming down!" will help make the job safer.

Note: Remember that the operator is ultimately responsible for the safe operation of their machines.

- 3.1.9 **Any other condition** of the work site that might **adversely impact** the safe operation of a fork lift will also cause the immediate halt of operations until the unsafe conditions can be eliminated or controlled.

3.2 **Machine inspection.** This inspection shall be conducted prior to the **start** of the shift. *Any problems or malfunctions that could affect the safe operation of the lift will be corrected prior to the operation of the lift.* The pre-shift inspection shall include:

- 3.2.1 **Parking Brake:** The parking brake must be able to **hold** the machine still on any surface the machine is capable of climbing.
- 3.2.2 **Service Brake:** Any condition of the service brake system that effects the smooth operation of the lift will be cause to immediately halt operations.
- 3.2.3 **Hydraulics/Batteries/Fuel:**
 - a. Leaks. Fluid levels. **Note: Control and clean up any leaks.**
 - b. Corrosion. **Note: Acid is corrosive and precautions must be taken.**
 - c. Cracked/split/frayed hoses.
- 3.2.4 **Operating controls:**
 - a. Operator controls – up, down, extend, retract, side shift, forward, backward, turns, emergency stop.
- 3.2.5 **Chassis assembly:**
 - a. Cracks.

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- b. Loose parts.
- c. Suspension.
- d. Tires/wheels/lug nuts.

NOTE: Tires on an axle must be of the same size and tread design, and are foam filled.

3.2.6 Lift mechanism/forks:

- a. Leaks. **Note: Control and clean up any leaks.**
- b. Loose/worn parts.
- c. Smooth operation.
- d. Uneven forks.
- e. Loose/uneven hoist chains.

3.2.7 Labels/Operating Manuals:

- a. Placards.
- b. Pinch points.
- c. Warnings.
- d. Manuals.
- e. Identification plate.
- f. Control markings.

- 3.3 Once it has been determined by job site and machine inspection that it is safe to operate the machine, proceed.

4. LIFTING CAPACITIES. These vehicles are designed to do one thing:

4.1 TRANSPORT MATERIALS.

4.1.1 Whether it's loading or unloading trucks, moving a stack from one spot to the next, or setting equipment in place, these machines will do it. There are some things they are **not** designed for:

- a. Lifting/Transporting people.
- b. Towing/Pulling other vehicles.
- c. Opening/Closing sliding doors, particularly railroad car doors.

4.2 In order to properly lift a load the operator will first determine:

4.2.1 The weight of materials being lifted does not exceed the rated capacity of the machine.

4.2.2 The load is evenly distributed and properly secured.

4.2.3 The ground the machine will be operated on meet the requirements for that machine.

4.2.4 The machine has been inspected prior to operation on that shift.

4.3 At least one of the workers is an operator certified for the machine he/she is on.

4.4 The rated capacity may be found in the **operator's manual** and the **load capacity plate**. If either of these are missing, the machine may not be operated.

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4.5 MATERIALS.

- 4.5.1 **Materials** that do not overload the machine when combined with **personnel** and **tools** may be lifted.
- 4.5.2 **Materials** that interfere with the safe operation of the machine may not be lifted.
- 4.5.3 **Materials** must be secured from tipping, spilling, or falling.
- 4.5.4 Avoid lifting **materials** on the railings.
- 4.5.5 Never exceed the **rated capacity** of the railings.
- 4.5.6 Remember that load capacities may be found in the **operator's manual** and on the **load capacity plate**.
- 4.5.7 "**High-Jacks**" or other equipment designed to lift material should be used for lifting **materials**.
- 4.5.8 Only manufacturer approved **attachments** may be used on a machine.

4.6 TOOLS.

- 4.6.1 **Tools** that do not overload the machine when combined with **materials** and **personnel** may be lifted.
- 4.6.2 **Tools** that interfere with the safe operation of the lift may not be lifted.
- 4.6.3 Never **throw** tools or materials up to or down from a lift.
- 4.6.4 Potentially **hazardous equipment** (such as gas bottles on welding rigs) must be secured prior to the operation of the machine.
- 4.6.5 When using **extension cords** and/or **gas hoses**, such as those used on cutting and welding rigs, exercise extreme caution to prevent them from becoming entangled in the moving and pinching parts of the machine.
- 4.6.6 When using tools that throw or drop **sparks** or **hot material**, protect the lower portions of the machine that could be damaged such as batteries, hydraulic hoses, etc. **Note: Batteries produce hydrogen gas.** (fire blankets can be used for shielding)
- 4.6.7 When using tools that throw or drop sparks or hot material that could possibly cause a fire, always use a "**fire watch**" person down below.
Note: The fire watch must extend ½ hour past the last "spark" or hot work point.
- 4.6.8 Always check with your Foreman about "**Hot Work Permits**" on your job site.

5. FUELING. The rules for fueling are as follows:

- 5.1 Fuel machines in **designated** areas.
- 5.2 Make sure your using the **proper** fuel for your machine.
- 5.3 Never fuel a machine with the engine running.

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- 5.4 Never smoke or allow open **flame** around a machine that's being refueled.
- 5.5 If acid or fuel gets into eyes, **rinse** thoroughly and obtain medical attention.
- 5.6 Gas and Diesel:
 - 5.6.1 Be sure the machine is properly grounded, and no static electricity exists between the fuel filler and the tank.
 - 5.6.2 **Ground** the nozzle to the fuel tank filler neck.
 - 5.6.3 Avoid **sparks**.
 - 5.6.4 Don't **overfill** the tank. Clean up any spills immediately.
- 5.7 Be sure the tank you're filling is the **fuel tank**! Many times the hydraulic tank is mistaken for the fuel tank. ***If this occurs, do not operate the machine.***
- 5.8 **Propane:**
 - 5.8.1 If a machine will not be used an hour or more, **shut off** the propane tank valve.
 - 5.8.2 Propane is **explosive**! Use extreme caution.
 - 5.8.3 Propane can cause **frostbite**. Use proper protective equipment.
 - 5.8.4 Propane gas is heavier than air and can **accumulate** in low areas.
 - 5.8.5 Only trained and **authorized** personnel are allowed to refill propane tanks.
 - 5.8.6 Tanks are under extreme **pressure**. A ruptured tank becomes a lethal rocket! Secure tanks when transporting them.
- 5.9 **Battery power:**
 - 5.9.1 If your machine is battery powered, charge the batteries in a well **ventilated** area.
 - 5.9.2 Remember that charging batteries produces **explosive** gases.
 - 5.9.3 If battery acid or fuel gets on your skin or clothes, **rinse** off thoroughly at once.
- 6. Congratulation! By completing this training session you are well on your way to becoming a safe equipment operator. By applying what you have learned you will be doing your part to control one of the main causes of accident and death on construction sites.
- 7. These rules and regulations are a compilation of federal, state, and local, rules and regulations. They are considered THERMA Company policy. They are intended to insure the safest possible operation of aerial lift machines.
- 8. **Failure to follow these policies will be cause for disciplinary action up to and including termination.**

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FORKLIFT/GRADALL DAILY INSPECTION CHECKLIST



To be completed **DAILY** by the operator or authorized person **BEFORE** each use.

Make:	Model:		Unit#:				
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Date:							
Hour Meter Reading:							
Operator/Inspector:							

For each "Inspection Item," indicate one of the following: P=Pass F=Fail N/A=Not Applicable

INSPECTION ITEM	M	T	W	Th	F	S	Su	Comments <i>Explain 'F'</i>
Labels/Operator Manual								
Chassis/Mast: Cracks, Welds, Deformation								
Seatbelt Function								
Wheels/Tires: Pressure, Cracks, Splits, Missing Lugs								
Fluid Levels/Leaks: Oil, Fuel, Water, Battery(s), Hoses								
Lights, Alarms, Horn, Backup Bell, Warning Lights								
Mirrors, Gauges								
Brakes: Operational, Parking								
Steering, Lift Controls								
Site: Holes/Drop-offs, Slopes, Grades, Uneven Surfaces								
Site: Electrical, Water, Sprinkler, Chemical Lines								
Site: Overhead Obstructions								
Equipment and site are safe for operation								

Note: Any item not checked requires the unit be taken out of service until the problem is corrected.

REPORT ALL DEFECTS TO YOUR SUPERVISOR/FOREMAN IMMEDIATELY

General Comments:

Standard Operating Procedure
Therma Self-Propelled Aerial Lift

Policy Section No.: 44
Revision No.:

Effective: 06-99
Revision Date:
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THERMA SELF-PROPELLED AERIAL LIFT



OUR PRIORITIES:

- 1. SAFETY**
- 2. QUALITY**
- 3. SCHEDULE**

“No job is so important that it may be performed without regard for safety, health and the environment.”

As with all job functions at THERMA, equipment operation is an important part of the service we provide to our customers. Because the operation of self propelled

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aerial lift equipment is inherently dangerous, it's important to be sure that safety is first and foremost in our minds any time we climb onto a piece of machinery.

DANGEROUS AT ANY SPEED:

Operating equipment in an unsafe manner is one of the major causes of injury and death in the construction industry. Aerial lift machines account for a large number of these accidents.

1. SAFETY, 2. QUALITY, 3. SCHEDULE:

In our business our customers expect, and should receive, only the *best, most professional* work available. The safest possible methods and professionalism go hand in hand. A professional that knows how to operate an aerial lift safely also knows that the **safe** operation of any piece of equipment is also the **fastest**, most professional way to work. Unsafe operations and short cuts are a sure way to increase accidents, injuries, and costs on a job. A remarkable thing occurs when safety is thought of **first**. The job is always of the best quality and is completed in the fastest, most economical way!

SAFETY IS JOB #1:

The long-standing commitment of THERMA to safety extends to certification of operators of aerial lift equipment. THERMA personnel must realize that as leaders in our industry, it's imperative that we continue to lead in the field of safety.

PERSONAL COMMITMENT:

The commitment of THERMA to safety is meaningless unless each individual is at least equal in his or her commitment. As an equipment operator you are one of the most highly visible people on any job site. Others on the job will look to you as an example of how safe or unsafe a company is. When others see you operating safely they will know that you are a professional, working for a professional company.

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1. RESPONSIBILITIES:

Responsibilities for the safe operation of these machines lie in three categories:

- **Manufacturer.**
- **Employer.**
- **Operator.**

1.1 Manufacturer: The manufacturer is required to produce a machine that meets all safety rules and regulations. The **dealer** provides a machine that is safe to operate and meets all laws, rules and regulations.

1.2 Employer: The employer provides the safest possible work site, enforces the rules and regulations covering the site and the type of work done, and makes sure that all personnel are trained for the type of work they are performing, including the operation of equipment.

1.3 Operator: The operator is responsible for the operating condition of the equipment, and insures that the operation of the equipment will not endanger personnel on and around the equipment. Before the operator uses an unfamiliar machine for the first time, he/she will read and understand the operator's manual. The operator is responsible for a pre-operation inspection of his/her equipment and the work site. When confronted with an unsafe condition or the unsafe actions of personnel on or around the equipment, the operator is to cease operations at once, and only resume when the unsafe conditions or actions are corrected.

It is a violation of company policy for any employee to operate equipment they are not certified for!

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2. TYPES OF MACHINES: There are several different types of **self propelled platform lifts** designed to lift personnel and materials to different work heights. These are:

- **SCISSORLIFT.**
- **BOOM SUPPORTED VERTICLE LIFT.**
- **BOOM TRUCK.**
- **ARTICULATED BOOM TRUCK.**

2.1 SCISSORLIFT/BOOM SUPPORTED VERTICLE LIFT. While they use different lifting mechanisms, these lifts have several similar characteristics:

- Platform with guardrails.
- The platform raises vertically to operating height.
- The platform remains stationed over the lower chassis at all heights.
- Designed to operate on smooth, level surface.

2.2 BOOM TRUCK. This machine differs from the previous machines in that:

- The Boom that supports the lift allows the working platform to extend beyond the support chassis.
- The work platform will reach over obstructions on the working surface.
- This type of truck will reach overhead areas a regular platform lift will not.

2.3 ARTICULATED BOOM TRUCK. This machine is very similar to a Boom Truck with these additional features:

- Because the support boom is hinged in several sections, it is able to reach over obstacles that even the **BOOM TRUCK** won't reach.
- It is also referred to as a **KNUCKLE BOOM TRUCK.**

2.4 SIMILARITIES. Because the basic safe operating characteristics of these machine are the same, they will be combined for the purposes of this training:

- **SCISSORLIFT** and **BOOM SUPPORTED VERTICLE LIFT** type machines will be referred to, as **PLATFORM LIFTS.**
- **BOOM TRUCKS** and **ARTICULATED BOOM TRUCKS** will be referred to as **BOOM TRUCKS.**
- Unless the selection specifies, the safe operation rules will apply to both groups of machines.

3. LIFTING CAPACITIES. These vehicles are designed to lift three things:

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- **WORKERS (primarily).**
- **TOOLS.**
- **MATERIALS.**

3.1 WORKERS. Any combination of workers may be lifted as long as:

3.1 (a) Their combined weight is evenly distributed over the platform.

3.1 (b) Their combined weight added to the weight of materials and tools also being lifted does not exceed the rated capacity of the machine.

3.1 (c) At least one of the workers is an operator certified for the machine he/she is on.

3.1 (d) The rated capacity may be found in the **operator's manual** and the **load capacity plate**. If either of these are missing, the machine may not be operated.

3.2 MATERIALS.

3.2 (a) Materials that do not overload the machine when combined with **personnel** and **tools** may be lifted.

3.2 (b) Materials that interfere with the safe operation of the machine may not be lifted.

3.2 (c) Materials must be secured from tipping, spilling, or falling.

3.2 (d) Avoid lifting **materials** on the railings.

3.2 (e) Never exceed the **rated capacity** of the railings.

3.2 (f) Remember that load capacities may be found in the **operator's manual** and on the **load capacity plate**.

3.2 (g) "High-Jacks" or other equipment designed to lift material should be used for lifting **materials**.

3.2 (h) Only manufacturer approved **attachments** may be used on a machine.

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3.3 TOOLS.

3.3 (a) Tools that do not overload the machine when combined with **materials** and **personnel** may be lifted.

3.3 (b) Tools that interfere with the safe operation of the lift may not be lifted.

3.3 (c) Never **throw** tools or materials up to or down from a lift.

3.3 (d) Potentially **hazardous equipment** (such as gas bottles on welding rigs) must be secured prior to the operation of the machine.

3.3 (e) When using **extension cords** and/or **gas hoses**, such as those used on cutting and welding rigs, exercise extreme caution to prevent them from becoming entangled in the moving and pinching parts of the machine.

3.3 (f) When using tools that throw or drop **sparks** or **hot material**, protect the lower portions of the machine that could be damaged such as batteries, hydraulic hoses, etc. **Note: Batteries produce hydrogen gas.** (fire blankets can be used for shielding)

3.3 (g) When using tools that throw or drop sparks or hot material that could possibly cause a fire, always use a “**fire watch**” person down below.
Note: The fire watch must extend ½ hour past the last “spark” or hot work point.

3.3 (h) Always check with your Foreman about “**Hot Work Permits**” on your job site.

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4. INSPECTIONS. Prior to operating one of these machines **2 inspections** must first be conducted:

- **JOB SITE.**
- **EQUIPMENT.**

4.1 JOB SITE. This inspection should take place at the **beginning of each shift**, or more often if conditions change during a shift. Operators should look for any object or condition, which will inhibit the **safe operation** of his/her machine. These include:

4.1 (a) Housekeeping. The job site shall be reasonably clear of **trash** and **debris**.

4.1 (b) Holes/Trenches. Any **openings** in the floor should be covered with bridge material capable of supporting 4 times the anticipated weight that may pass over it. When openings are not covered, the operator may not approach closer than 18" to the edge of the opening.

4.1 (c) Floors. Inspect for bumps, obstructions, and uneven conditions that **could effect** the machine.

4.1 (d) Lighting. The operator should be able to see well enough to **safely operate** his machine. OSHA Regulations State that the minimum general lighting acceptable on construction sites is 5 foot candles. This is not much light to operate by, therefore extreme caution is needed under these conditions. "Task", or work lighting is provided by THERMA and will be sufficient for the type of work performed.

4.1 (e) Weather. Wet floors, high wind and other weather related conditions can be very **hazardous**. Always check for these conditions before operating a lift.

4.1 (f) Overhead obstructions. Never move a lift when there is danger of striking an **overhead obstruction**. This will cause the machine to turn over. Overhead obstructions can also crush workers. One of the most common injuries is smashed fingers from holding onto the side rails while rising.

4.1 (g) High voltage lines. The minimum clearance for high voltage lines of 50 kilovolts is 10'. Make sure you have **clearance** around all electrical lines while operating.

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4.1 (h) Foot traffic. Watch for people **at all times**. On some machines the driver can't see people if they are very close. Shouted warnings such as, "Coming down!" will help make the job safer.

Note: Remember that the operator is ultimately responsible for the safe operation of their machines.

4.1 (i) Any other condition of the work site that might **adversely impact** the safe operation of a lift will also cause the immediate halt of operations until the unsafe conditions can be eliminated or controlled.

4.2 Machine inspection. This inspection shall be conducted prior to the **start** of the shift. *Any problems or malfunctions that could affect the safe operation of the lift will be corrected prior to the operation of the lift.* The pre-shift inspection shall include:

4.2 (a) Automatic brake: The brake must be able to **hold** the machine still on any surface the machine is capable of climbing.

4.2 (b) Hydraulics/Batteries/Fuel:

- Leaks. Fluid levels. **Note: Control and clean up any leaks.**
- Corrosion. **Note: Acid is corrosive and precautions must be taken.**
- Cracked/split/frayed hoses.

4.2 (c) Operating and Emergency controls:

- Upper controls – up, down, extend, rotate, forward, backward, turns, emergency stop.
- Upper controls must be designed or guarded so that they may not be inadvertently operated. CAL-OSHA says toggle type switches must have side guards on each toggle switch.
- Lower emergency controls may only be used with **consent of the operator**, in an **emergency**, or for routine maintenance and **inspections**.

4.2 (d) Chassis/lower frame:

- Cracks.
- Loose parts.
- Suspension.
- Tires and wheels.

NOTE: Tires on an axle must be of the same size and tread design, and are foam filled.

- Outriggers/Stabilizers/Extendible axles.

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4.2 (e) Lift mechanism/Boom:

- Leaks. **Note: Control and clean up any leaks.**
- Loose/worn parts.
- Smooth operation.

4.2 (f) Work platform/Bucket.

- Guardrail/ Toeboard.
- Gate/Chain.
- Fall Protection.
- Platform extension.

4.2 (g) Cables/Wiring harness.

- Loose cables.
- Frayed cables.
- Cracked harness.
- Exposed wiring.

4.2 (h) Labels/Operating Manuals:

- Placards.
- Pinch points.
- Warnings.
- Manuals.
- Load capacity plate.
- Control markings.

5. OPERATION. The **operation** of the machine will be addressed in five sections:

- **GENERAL SAFETY RULES.**
- **MOVING.**
- **RAISING/LOWERING.**
- **BOOM TRUCKS.**
- **FUELING.**

5.1 General Safety Rules. These rules will apply during **all** operations of powered Aerial Platform Vehicles:

5.1 (a) No alteration, disabling, or otherwise rendering **inoperable** of safety devices or interlocks is permitted. Operating a machine with disabled safety interlocks will be cause for immediate termination.

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5.1 (b) Never **alter** or **modify** an aerial lift without permission from the manufacturer.

5.1 (c) Never operate a lift from a truck, trailer, railway car, floating vessel, scaffold, or other similar construction without **written permission** of the manufacturer.

5.1 (d) No devices of any kind may be used to add to the **height** of the platform. The maximum operating height of a lift is the fully raised height of the platform plus 6 feet.

5.1 (e) All gates, chains, or other safety enclosure devices must be properly **fastened** prior to the operation of any equipment, regardless of planned operational height.

5.1 (f) Never **exceed** the weight capacity of the equipment.

5.1 (g) When operating around **high voltage** lines maintain the following clearances:

- 0 to 300V -----avoid contact.
- 300V to 50KV -----10'
- 50KV to 200KV -----15'
- 200KV to 350KV -----20'
- 350KV to 500KV -----25'
- 500KV to 750KV -----35'
- 750KV to 1000KV -----45'

5.1 (h) The **lower controls** on a machine may only be used:

- In **emergencies**.
- For **inspections** and/or **servicing**.
- With the operator's **permission**.

5.1 (i) When doing **hot-work** on a lift, be sure the batteries, hydraulic systems, and wiring cables are protected from sparks, heat, and flame. Always use a **fire watch** when performing hot-work on a lift.

5.1 (j) The operator shall always be aware of **changing conditions** of the job site. These can be weather related, or may be specific to the site. When changes occur operation may need to be altered as needed to maintain safe operation. If an unsafe condition exists that can't be corrected, the operator

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will cease operation of the machine until the unsafe condition can be rendered safe.

Remember, The operator is responsible for the safe operation of his/her machine.

5.1 (k) If personnel working around a machine endanger themselves by unsafe actions, the operator shall **warn** them of the potential results of their actions. If the unsafe practices persist the operator will immediately cease operation of the machine and inform his/her supervisor of the circumstances.

5.1 (l) Watch for other equipment. Never allow the operation of your machine to **endanger** the safe operation of another machine.

5.1 (m) Once a machine is positioned and raised to it's working height, engage the **emergency stop** switch. This will prevent the inadvertent operation of the machine should the controls get bumped.

5.2 Moving. Whenever a machine is **moved** the operator will follow these safety rules:

5.2 (a) Make sure the machine can be moved without striking or endangering any objects or people around the machine. This means if vision is limited, the operator needs to walk to the back of the platform to check **clearance** prior to movement.

5.2 (b) If the machine is operating around a dock, trench, or other **opening** in the floor that could cause it to turn over, the machine may not come closer than 18":

5.2 (c) Ground speed will be **limited** to conditions of the travel surface.

5.2 (d) The floor will be **free** of debris, objects, bumps, or openings in the floor that will cause the machine to tip over.

5.2 (e) Check for overhead **clearance** prior to movement.

5.2 (f) Bridge plates, dock plates, floor opening covers, ramps, or any other device the machine will pass over must be able to safely **support** the full weight of the machine and it's contents. **Dismount** all personnel except the driver when crossing these areas.

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5.2 (g) All personnel on the lift must maintain firm **footing** on the work platform at all times.

5.2 (h) The machine must be at its **lowest** height while moving. These machines may only be moved while raised for the purpose of final positioning.

5.2 (i) Never **pass** another machine traveling in the same direction until given the go-ahead signal from the other driver.

5.2 (j) Never turn a machine around on a **grade** or **slope**. Drive the machine to level ground and turn around there.

5.2 (k) Avoid wrapping **fingers** or **hands** around railings while traveling.

5.2 (l) When **visibility** is a problem, a ground guide shall be used to insure safe movement.

5.3 RAISING/LOWERING. When **raising** or **lowering** the platform of a machine, the operator must follow these safety rules:

5.3 (a) Be sure all safety chains and gates are **closed** and locked prior to operation.

5.3 (b) Never wrap fingers or hands around **railings** while the machine is in operation.

5.3 (c) Keep all parts of the body **inside** the railings while the machine is in operation.

5.3 (d) All materials and tools must be placed so they will **not impede** the safe operation of the machine or obstruct the controls in any way.

5.3 (e) Never move the machine with the platform raised except for **final** positioning

5.3 (f) When at raised levels, the work you do may endanger those on the ground or around you. Always set up **exclusion zones** when this condition exists.

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5.3 (g) These machines are designed to operate on flat, level ground. Never operate a machine on a grade or slope that **exceeds** the manufacturer's specifications. Grade and slope are defined as the following:

- **Grade** - A fore and aft surface condition causing one **end** of a machine to be lower or higher than the other .
- **Slope** - A side to side surface condition causing one **side** of a machine to be lower or higher than the other.

Consult the manufacturer's **manual** on the machine for slope and grade limitations.

5.3 (h) Make sure all devices designed to **stabilize** the machine are engaged and operable prior to raising the platform. These devices include:

- **Automatic stabilizers.**
- **Outriggers.**
- **Extendible axles.**

5.3 (i) Some machines may have **reduced** lifting capacities when stabilizing devices can't be used. Consult the manufacturer's manual prior to operation.

5.3 (j) Prior to lifting or lowering, the operator is to check for overhead, underneath and side to side clearance. The machine must be able to rise or lower **unobstructed**.

5.3 (k) If any part of the machine becomes snagged, entangled, jammed, or otherwise is unable to move due to obstruction of any kind, the operator will **stop** the machine, instruct the occupants to **cease** movement, and call for help. The platform must be **evacuated** of all personnel prior to attempts to free the machine using the lower controls. **NOTE: This is an extremely dangerous situation and must never be underestimated!**

5.3 (l) Some machines have platform **extensions** to extend the reach of the working surface. Never exceed the weight capacities of these extensions. Consult the manufacturer's manual prior to operation.

5.3 (m) Occupants of the platform must maintain firm **footing** on the platform at all times.

5.3 (n) No **height** adding devices or materials are to be used on lifts at any time.

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5.3 (o) In the event personnel must climb out of the platform for any reason, and if the platform is higher than 6' off the ground, they must first be properly **tied off** with a full body harness and appropriate lanyard(s). **Always tie-off 100%!**

5.3 (p) Once the platform is at working height, engage the **emergency** stop. This will insure the controls will not be inadvertently engaged while work is taking place.

5.4 BOOM TRUCK. Boom trucks have their own unique operating **characteristics**. In addition to the rules already mentioned, Boom truck operators must also follow these rules:

5.4 (a) Speed Control. Most machines have a dial on them to adjust the speed of the machine's reaction to control input. By adjusting this control to a lower number, the machine will move slowly and safely. Consult the manufacturer's manual for information prior to operating a Boom truck.

5.4 (b) Capacities. Weight capacities are extremely important in these machines. Never exceed the rated weight capacity for the vehicle.

5.4 (c) Obstructions: it's very easy to "jack" the wheels off the ground with one of these machines. When swinging a boom in close to obstructions, reduce the approach speed and use extreme caution.

5.4 (d) Never place any part of a Boom truck **against** another object to "steady it".

5.4 (e) Never use a Boom truck as a **crane**.

5.4 (f) Boom trucks, even when fully lowered, can "oscillate" while traveling over uneven ground, causing the operator to be thrown from the machine. Drive slow and use caution when driving Boom trucks over **uneven ground**.

5.4 (g) When operating a Boom or Knuckle Boom truck the operator and anyone in the bucket must be wearing a **harness and lanyard**, and must be properly **tied off** while in the bucket.

5.4 (h) Boom truck directional controls will operate in **reverse** when the boom is positioned at the other end the machine.

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5.4 (i) When fully retracted, the bucket portion of a Boom truck extends well to the rear of the axle. This will cause the bucket to **swing** in the opposite direction when the truck is turned sharply. Maintain adequate clearance for this effect.

6. FUELING. The rules for fueling are as follows:

6.1 Fuel machines in **designated** areas.

6.2 Make sure your using the **proper** fuel for your machine.

6.3 Never fuel a machine with the engine running.

6.4 Never smoke or allow open **flame** around a machine that's being refueled.

6.5 If acid or fuel gets into eyes, **rinse** thoroughly and obtain medical attention.

6.6 Gas and Diesel:

6.6 (a) Be sure the machine is properly grounded, and no static electricity exists between the fuel filler and the tank.

6.6 (a) Ground the nozzle to the fuel tank filler neck.

6.6 (b) Avoid **sparks**.

6.6 (c) Don't **overfill** the tank. Clean up any spills immediately.

6.7 Be sure the tank you're filling is the **fuel tank!** Many times the hydraulic tank is mistaken for the fuel tank. ***If this occurs, do not operate the machine.***

6.8 Propane:

6.8 (a) If a machine will not be used an hour or more, **shut off** the propane tank valve.

6.8 (b) Propane is **explosive!** Use extreme caution.

6.8 (c) Propane can cause **frostbite**. Use proper protective equipment.

6.8 (d) Propane gas is heavier than air and can **accumulate** in low areas.

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6.8 (e) Only trained and **authorized** personnel are allowed to refill propane tanks.

6.8 (f) Tanks are under extreme **pressure**. A ruptured tank becomes a lethal rocket! Secure tanks when transporting them.

6.9 Battery power:

6.9 (a) If your machine is battery powered, charge the batteries in a well **ventilated** area.

6.9 (b) Remember that charging batteries produces **explosive** gases.

6.9 (c) If battery acid or fuel gets on your skin or clothes, **rinse** off thoroughly at once.

Congratulation! By completing this training session you are well on your way to becoming a safe equipment operator. By applying what you have learned you will be doing your part to control one of the main causes of accident and death on construction sites.

These rules and regulations are a compilation of federal, state, and local, rules and regulations. They are considered THERMA Company policy. They are intended to insure the safest possible operation of aerial lift machines.

Failure to follow these policies will be cause for disciplinary action up to and including termination.

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SCISSOR/BOOM LIFT DAILY INSPECTION CHECKLIST



To be completed **DAILY** by the operator or authorized person **BEFORE** each use.

Make:	Model:		Unit#:				
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Date:							
Hour Meter Reading:							
Operator/Inspector:							

For each "Inspection Item," indicate one of the following: P=Pass F=Fail N/A=Not Applicable

INSPECTION ITEM	M	T	W	Th	F	S	Su	Comments <i>Explain 'F'</i>
Labels/Operator Manual								
Chassis/Mast: Cracks, Welds, Deformation								
Seatbelt Function								
Wheels/Tires: Pressure, Cracks, Splits, Missing Lugs								
Fluid Levels/Leaks: Oil, Fuel, Water, Battery(s), Hoses								
Lights, Alarms, Horn, Backup Bell, Warning Lights								
Mirrors, Gauges								
Brakes: Operational, Parking								
Steering, Lift Controls								
Site: Holes/Drop-offs, Slopes, Grades, Uneven Surfaces								
Site: Electrical, Water, Sprinkler, Chemical Lines								
Site: Overhead Obstructions								
Equipment and site are safe for operation								
Railings/Safety Chains/ Extensions								
Stabilizers/Outriggers								
Operating/Emergency Controls: Upper, Lower, Guards								

Note: Any item not checked requires the unit be taken out of service until the problem is corrected.

REPORT ALL DEFECTS TO YOUR SUPERVISOR/FOREMAN IMMEDIATELY

General Comments:

<p style="text-align: center;">Safety Manual</p> <p style="text-align: center;">Non-Electrical Hot Work (NEHW) Program</p>

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Revision No.: 3

Effective: 06-99
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Non-Electrical Hot Work (NEHW) Program

1 Purpose and Scope:

- 1.1 This program provides guidance for developing an effective process to manage hot work operations. All property losses caused by hot work as an ignition source are preventable. Under the right conditions, hot work heat sources with the lowest temperature ratings can easily ignite products that seem most difficult to burn.

2 Responsibility:

- 2.1 It is the responsibility of all supervisors to ensure employees involved in hot operations are trained in the requirements of the NEHW program. This includes the safe operation of their equipment and safe operation of the process.
- 2.2 It is the responsibility of the supervisor (foreman) to inspect the work area and authorize the NEHW.
- 2.3 It is the responsibility of the supervisor (foreman) to notify the safety department if NEHW is to be conducted in a confined space.
- 2.4 It is the responsibility of all employees involved in NEHW to follow the requirements of the NEHW program.
- 2.5 The Safety Department Manager is responsible for reviewing and updating the NEHW program annually.
- 2.6 The safety department is responsible for authorizing NEHW in a confined space.

3 Policy:

- 3.1 Definitions:
 - 3.1.1 NEHW is any operation involving open flames or producing heat and/or sparks. This includes but is not limited to: brazing, cutting, soldering, welding, heat guns and grinding.

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- 3.1.2 NEHW Permit is the document required when any temporary or non-routine operation involving open flame or spark-producing work consistent with Article 49 of the California Fire Code.
- 3.1.3 Fire Watch is a person who is trained in the use of fire extinguishing equipment and maintains constant watch during NEHW operations and initiates incipient level fire suppression when fire occurs.
- 3.2 Planning:
 - 3.2.1 Avoid hot work whenever possible. Consider alternative methods to hot work. Some alternatives include:
 - a. Manual hydraulic shears vs. saw/torch cutting.
 - b. Mechanical bolting vs. welding.
 - c. Screw or flanged pipe vs. sweat soldering.
 - d. Reciprocating saw vs. radial saw.
 - 3.2.2 Prohibit hot work in areas where hot work cannot be conducted safely under any conditions or where extensive preparation and planning are required to make the area/equipment fire safe. These areas may include:
 - a. Areas/equipment that contain/handle flammable liquids, flammable gases, combustible dusts or combustible metals.
 - b. Partitions, walls, ceilings or roofs with combustible plastic coverings or cores (e.g. expandable plastic insulation, sandwich cores).
 - c. Oxygen enriched atmosphere.
 - d. Areas which handle/store oxidizer materials.
 - e. Areas which handle/store explosive materials.
 - 3.2.3 Fire extinguishing equipment shall be readily available during all hot work operations.
 - 3.2.4 The jobsite Foreman is responsible for site inspection and authorization of hot work.
 - 3.2.5 Before hot work is authorized, the area will be inspected. Inspections shall be documented on the hot work permit.
 - 3.2.6 First Aid equipment shall be made available at all times.
 - 3.2.7 Employees responsible for the maintenance, use, or repair of oxygen, or fuel gas supply equipment, must be trained and evaluated by a competent person prior to the assignment of duties
 - 3.2.8 Prior to the assignment of duties, supervisors must ensure that all employees have been properly trained and certified to operate arc welding and cutting equipment.

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- 3.2.9 Employees who operate welding and cutting equipment shall operate the equipment according to the manufacturer's instructions and / or recommendations.
- 3.2.10 Employees that maintain and / or repair welding and cutting equipment shall be trained by the manufacturer and / or their authorized representative.
- 3.3 When hot work must be conducted in areas or equipment containing hazardous processes described above, follow the precautions outlined below.
 - 3.3.1 When possible, relocate hot work to a suitably arranged and isolated fixed hot work station. Locate fixed hot work in areas with secured and sealed one-hour fire-rated non-combustible barriers over combustible floors, walls and ceilings. Maintain the hot work station free of combustible material or an open space not less than 35 feet. Provide manual fire extinguishers throughout the hot work station area.
 - 3.3.2 If materials cannot be relocated to a fixed hot work station and hot work is unavoidable, implement the Non-Electrical Hot Work Permit System. Ensure the following fire prevention precautions are in place prior to starting the hot work.
 - a. Ensure sprinklers and other fixed fire protection equipment is in service and operable.
 - b. Provide manual firefighting equipment appropriate for the construction/occupancy hazards in the hot work area.
 - c. Inspect and maintain hot work equipment prior to use.
 - d. Separate hot work operations from combustibles by a minimum of 35 feet. An alternative is to use proper fire-resistive welding blankets and screens to isolate hot work from adjacent combustibles and/or occupancies.
 - e. Sweep floor clean. Remove grease or oil. Cover with fire-resistive tarps/covers.
 - f. Remove flammable liquids, dust and/or lint from hot work area.
 - g. Cover all floor and wall openings with fire-resistive tarps/covers.
 - h. Close all doors and fire doors to prevent sparks from escaping.
 - i. Eliminate any present or potential explosive atmospheres (dust or vapor). Continuously monitor the area for accumulation of combustible gases before, during and after hot work.
 - j. Secure, isolate and vent pressurized vessels, piping and equipment as needed prior to initiating hot work. Clean

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combustible and/or flammable materials whenever present.

3.3.3 Avoid hot work of any kind in areas handling, processing or storing flammable liquids or gases. Ideally, relocate any hot work operation within a flammable liquid or gas occupancy to a non-hazardous location. When relocation is not possible, the following additional precautions shall be implemented:

- a. Drain all equipment or piping in the area of flammable and combustible liquids.
- b. Steam clean all equipment/piping to be worked on or purge with an inert atmosphere to prevent creation of flammable vapors.
- c. Shut off pipe supplying the area with flammable liquids/gases at the source. LOTO all valves to prevent unexpected opening. If the pipe is to be worked on, blank it off.
- d. Use a portable O₂ monitor to ensure the pipe/equipment does not contain sufficient oxygen to support combustion.
- e. Protect all permanent tanks or piping that cannot be drained from physical contact and heat from hot work equipment.
- f. Keep mechanical exhaust ventilation in the room/building in operation.
- g. Use portable combustible gas monitor before and during work. If any detectable readings are obtained work cannot begin until the source is located and eliminated.

3.3.4 NEHW in confined space (for complete entry guidelines, reference Confined Space Entry Program).

- a. Ventilation is a pre-requisite for work in a confined space.
- b. Local exhaust ventilation must be provided when welding, cutting, or heating in a confined space.
- c. When sufficient ventilation cannot be obtained without blocking the means of access, workers in the confined space must be provided with supplied air respirators.
- d. Workers must be attached to a lifeline at all times while in the confined space. Means must be provided to quickly remove the worker in case of an emergency and another employee capable of initiating rescue operations must be outside at all time.
- e. Continuous air monitoring shall be conducted while the work is being performed on NEHW in a confined space.
- f. An attendant shall be stationed outside the confined space and shall maintain communication with the worker at all times.
- g. Cylinders containing fuel gas or oxygen must not be taken into a confined space.

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- 3.3.5 Protecting workers from the hazards associated with NEHW.
- Local ventilation or air supplied respirators must be provided in enclosed space when welding, cutting, or heating metals containing zinc, lead, cadmium, chromium, mercury and beryllium (beryllium requires both local ventilation and air supplied respirators).
 - Torch gas supply must be shut off outside an enclosed space when not in use and left unattended for a substantial period of time such as a lunch break.
 - Torches and hoses must be removed from enclosed spaces overnight and at shift changes.
 - Open-end fuel gas and oxygen hoses must be immediately removed from enclosed spaces when they are disconnected from the torch or other gas-consuming device.

3.4 Equipment:

- 3.4.1 Gas Welding and Cutting:
- Valve protection caps must be in place and secured when transporting gas cylinders.
 - Hoisted cylinders must be secured on a cradle, slingboard or pallet.
 - Cylinders must be in vertical position when transported by powered vehicles.
 - Valve protection caps must not be used for lifting cylinders.
 - Cylinders not firmly secured on a specially designed carrier must have regulators removed and caps put in place before moving.
 - A cylinder truck, chain or other steadying device must be used to keep cylinders from being knocked over while in use.
 - Cylinder valves must be closed when empty or being moved.
 - Compressed gas cylinders must be secured in an upright position at all times.
 - Oxygen and fuel-gas cylinders in storage must be separated from each other or combustible materials at least 20 feet or a 5-foot high noncombustible wall with a minimum fire resistance rating of one-half hour.
 - Cylinders should be stored in assigned places away from elevators, stairs or gangways.
 - Cylinders in use must not be within reach of sparks, hot slag or flame unless fire resistant shields are provided.

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- l. Cylinders must be placed where they cannot become part of an electrical circuit.
- m. Electrodes must not be stuck against a cylinder.
- n. Cylinders containing oxygen or fuel gas must not be taken into confined spaces.
- o. Cylinders, whether full or empty, must not be used as rollers or supports.
- p. Damaged or defective cylinders must not be used and must be removed from service.
- q. Before connecting the regulator, the cylinder valve must be opened slightly, and then closed.
- r. Cylinder valves must always be opened slowly to prevent damage to the regulator.
- s. The cylinder valve must always be closed and gas released before removing the regulator.
- t. Hoses must be inspected before each shift and removed from service if defective.
- u. Hoses, cables and other equipment must be kept clear of passageways, ladders and stairs.
- v. Torches must be lighted by friction lighters and not by matches or hot work.

3.4.2 Arc Welding and Cutting:

- a. Employers must instruct employees in the safe means of arc welding and cutting.
- b. Only manual electrode holders designed for arc welding and cutting are allowed to be used.
- c. Any current-carrying parts passing through the portion of the holder and outer surfaces of the jaws must be fully insulated.
- d. All arc welding and cutting cables must be of the completely insulated, flexible type.
- e. Only Undamaged cable, free of repair, can be used within 10 feet from the electrode holder.
- f. Connected or spliced lengths of cable must have substantial insulation connectors of a capacity at least equivalent to that of the cable in use.
- g. Cables connected by metal lugs must be securely fastened together for good electrical contact and exposed metal parts must be completely insulated.
- h. Damaged cables in need of repair must not be used.
- i. A ground return cable must have safe current-carrying capacity equal to or exceeding the maximum output capacity of the arc welding and cutting unit.
- j. A ground return cable serving more than one unit must have safe current-carrying capacity of the total maximum output capacity of all connected units.

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- k. Pipelines containing gases or flammable liquids, or conduits containing electrical circuits, must not be used as a ground return.
- l. Structures or pipelines used as ground return circuits must have electrical contact at all joints.
- m. The generation of an arc, sparks, or heat at any point must cause rejection of the structure or pipeline as a ground return circuit.
- n. Structures or pipelines used as a ground return must have all joints bonded and periodically inspected to ensure no unsafe conditions such as a fire hazard or condition of electrolysis.
- o. The frames of arc welding and cutting machines must be grounded through a third wire in the cable or a separate wire grounded at the source of current.
- p. Ground connections must be inspected to ensure they are mechanically strong and electrically adequate for required current.
- q. Electrode holders left unattended must have electrodes removed and holders must be placed to prevent contact with employees or conduction objects.
- r. Hot electrode holders must not be dipped in water.
- s. The equipment power switch must be turned off whenever leaving the machine, stopping work for any appreciable length of time, or moving the machine.
- t. Whenever practicable, arc welding and cutting operations must be shielded by non-combustible or flameproof screens, which protect other employees from direct rays.

3.5 Fire Watch:

- 3.5.1 Fire Watch is required whenever welding or cutting is performed in locations where other than a minor fire might develop, or any of the following conditions exist:
- a. Appreciable combustible material, in building construction or contents, closer than 35 feet to the point of operation.
 - b. Appreciable combustible materials are more than 35 feet away but are easily ignited by sparks.
 - c. Wall or floor openings within a 35-foot radius which expose combustible material in adjacent areas including concealed spaces in walls or floors.
 - d. Combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by conduction or radiation.

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- 3.5.2 The assigned Fire Watch shall be trained in the use of fire extinguishing equipment and be familiar with the facility for sounding an alarm in the event of a fire.
- 3.5.3 Fire Watch shall be in place and monitor the area during, and for 45 minutes after the hot work is completed, including coffee or lunch breaks.
- 3.5.4 Fire Watch shall be equipped with suitable fire extinguishing equipment.
- 3.5.5 Fire Watch is responsible for inspecting his/her fire extinguishing equipment prior to any hot work.
- 3.5.6 Fire Watch shall watch for fires in all exposed areas and try to extinguish them when obviously within the capacity of the equipment or otherwise sound the alarm.

<p>Safety Manual</p> <p>Trenching And Excavation Safety</p>

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Revision No.: 2

Effective: 06-99
Revision Date: 02-11
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Trenching and Excavation Safety Program

1. Scope and Application:

- 1.1 This program sets forth the practices required for trenches or excavations with a depth of five feet or greater along any portion of its length that will be entered by Therma employees and subcontractors. All excavations or trenches 5 feet or greater in depth shall be appropriately benched, shored, or sloped according to the procedures and requirements set forth in this policy. Excavations or trenches 20 feet deep or greater must have a protective system designed by a registered professional engineer.

2. Responsibilities:

- 2.1 Supervisors have the primary responsibility for the implementation of the Trenching and Excavation Safety Policy in their work area. The supervisor has ultimate responsibility for the safety of the employees and general public affected by the excavation. This includes evaluation of the work to be performed, determination of the means of protection that will be used and adherence to the provisions of this policy as appropriate.
- 2.2 Foremen must ensure daily, or more often as required, that site conditions are safe for employees to work in excavations.
- 2.3 The supervisor or a member of the work group must be a "competent person" as defined by OSHA.
- 2.4 Employees have the primary responsibility for working in accordance with the provisions of this policy.
- 2.5 No employees should enter an excavation meeting the scope of this policy until authorized by the competent person.
- 2.6 Foremen have the primary responsibility for providing training, trench protection systems, effective barricades and supporting the use of other protective measures deemed prudent and necessary by the competent person.
- 2.7 Safety Department has the primary responsibility for assisting Foremen in implementation of this policy through coordinating training and consultation. **This includes:**

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- 2.7.1 On site evaluation to monitor use of safe work practices and procedures.
- 2.7.2 Assisting with atmospheric testing and equipment selection as needed.
- 2.7.3 Providing or identifying appropriate training for Competent Persons and staff.
- 2.7.4 Providing technical assistance as needed.
- 2.7.5 Reviewing and updating the program at least annually.

3. Definitions:

- 3.1 **Benching** - means a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near vertical surfaces between levels.
- 3.2 **Cave-in** - means the separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.
- 3.3 **Competent person** - means one who is capable to identify existing and predictable hazards in the surroundings or working conditions that may affect employees and the general public, and who has authority to take prompt corrective measures to eliminate them. **The Competent Person(s):**
 - 3.3.1 Must be trained in and knowledgeable of excavation and trenching standard, and other programs that may apply (Hazard Communication, Confined Space, Respiratory Protection).
 - 3.3.2 Must be capable of recognizing hazardous conditions and must have authority to stop work and ensure that hazards are corrected.
 - 3.3.3 Performs and documents the 'Daily Excavation Inspection', and knows when inspections should be performed.
 - 3.3.4 Must assure that the location of underground installations or utilities have been properly located.
 - 3.3.5 Must identify and ensure the use of adequate protective systems, work methods and personal protective equipment (PPE) on the excavation site.
- 3.4 **Excavation** - means any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

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- 3.5 Registered professional engineer (RPE)** - means a person who is registered as a professional engineer.
- 3.6 Shield (shield system)** - means a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees with the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Also known as trench boxes or trench shields.
- 3.7 Shoring (shoring system)** means a structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.
- 3.8 Sloping (sloping system)** - means a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline varies with differences in such factors as the soil type, environmental exposure conditions, and application of surcharge loads.
- 3.9 Soil Type A** - Most stable: clay, silty clay, and hardpan (resists penetration). No soil is Type A if it is fissured, is subject to vibration of any type, has previously been disturbed, or has seeping water. As most soils in areas where work will be conducted at UF have been disturbed, no UF soils will be considered Type A.
- 3.10 Soil Type B** - Medium stability: silt, sandy loam, medium clay and unstable dry rock; previously disturbed soils unless otherwise classified as Type C.
- 3.11 Soil Type C** - Least stable: gravel, loamy sand, soft clay, submerged soil or dense, heavy unstable rock, and soil from which any water is seeping.
- 3.12 Soil - Mixed Types (Layered Geological Strata)** - The soil must be classified on the basis of the soil classification of the weakest soil layer. Each layer may be classified individually if a more stable layer lies below a less stable layer, i.e. where a Type C soil rests on top of stable rock.
- 3.13 Trench (trench excavation)** - means a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet. If forms or other structures are installed or constructed in an excavation as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet or less, the excavation is also considered to be a trench.

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4. Procedures:

- 4.1 Under Ground Utilities:** Underground utilities must be located and marked before excavation begins. A competent person shall be identified for all excavations with a depth of five feet or greater at any portion that personnel may enter. The location of sewers, telephone, fuel, electric, water lines, or any other underground installations that may be encountered during excavation work must be determined and marked prior to opening an excavation. The Project Manager shall make arrangements as necessary with the appropriate utility agency for the protection, removal, shutdown, or relocation of underground installations. If it is not possible to establish the exact location of these installations, the work may proceed with caution if detection equipment or other safe and acceptable means are used to locate the utility. Excavations must not endanger the underground installations or the employees engaged in the work. Utilities left in place should be protected by barricades, shoring, suspension or other means as necessary to protect employees.
- 4.2 Protection of the Public:** Excavations must be isolated from public access by a substantial physical barrier. Barricades, lighting and posting shall be installed as appropriate prior to the start of excavation operations. All temporary excavations of this type shall be backfilled as soon as possible. Guardrails, fences, or barricades should be installed around excavations adjacent to walkways, roads, paths or other traffic areas. Use of barricade tape alone is not considered a sufficient method of isolation when the excavation is unattended. Warning lights or other illumination shall be used as necessary for the safety of the public at night. Wells, holes, pits, and similar excavations must be effectively barricaded or covered and posted. Walkways or bridges used by the general public to cross excavations must be equipped with standard guardrails.
- 4.3 Surface encumbrances.** All equipment, materials, supplies, buildings, roadways, trees, utility vaults, boulders, etc. that could present a hazard to employees working in the excavation must be removed or supported as necessary to protect employees.
- 4.4 Soil Classification:** The competent person in charge of the excavation shall be responsible for determining the soil type. All previously disturbed soil is automatically considered Type B or C soil. Soil may be considered Type C by default and no additional tests required. To classify soil as type B the competent person shall use a visual test coupled with one or more manual tests.

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- 4.5 Visual test:** Evaluate the conditions around the site including the soil adjacent to the site and the soil being excavated. Identify any signs of vibration. Check for crack-line openings along the failure zone, look for existing utilities that indicate that the soil has been previously disturbed, and observe the open side of the excavation for indications of layered geologic structuring. Look for signs of bulging, boiling, or sloughing, as well as signs of water seepage from the sides or bottom of the excavation.

The area adjacent to the excavation should be evaluated for foundations or other intrusions into the failure zone, and the evaluator should check the spoil distance from the edge of the excavation.

Any one of the following will cause soil to be classified as Type C.

- 4.5.1 Water seepage into excavation.
- 4.5.2 Vibration from road traffic or equipment.
- 4.5.3 Signs of bulging, boiling, or sloughing.
- 4.5.4 Crack lines along failure zone.

4.6 Manual tests:

4.6.1 Thumb penetration test: Attempt to press the thumb firmly into the soil in question. If the thumb penetrates no further than the length of the nail, it is probably Type B soil. If the thumb penetrates the full length of the thumb, it is Type C. It should be noted that the thumb penetration test is the least accurate testing method.

4.6.2 Dry strength test: Take a sample of dry soil. If it crumbles freely or with moderate pressure into individual grains it is considered granular (Type C). Dry soil that falls into clumps that subsequently break into smaller clumps (and the smaller clumps can only be broken with difficulty) it is probably clay in combination with gravel, sand, or silt (Type B).

4.6.3 Plasticity or Wet Thread Test: Take a moist sample of the soil. Mold it into a ball and then attempt to roll it into a thin thread approximately 1/8 inch in diameter by two inches in length. If the soil sample does not break when held by one end, it may be considered Type B. A pocket penetrometer, shearvane, or torvane may also be used to determine the unconfined compression strength of soils.

5. Protective Systems

- 5.1 In excavations greater than 5 feet in depth a method to protect people entering the excavation from cave in must be employed.

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Acceptable protective methods include sloping, benching, shielding and shoring.

5.2 Benching, Sloping, Shoring, and Shielding Requirements:

6. General:

- 6.1 Excavations under the base of the footing of a foundation or wall require a support system designed by a registered professional engineer. Sidewalks, pavement, utility vaults or other similar structures shall not be undermined unless a support system or another method of protection is provided to protect employees from their possible collapse. Sloping or benching is often the preferred methods of protection; however, shoring or shielding is used when the location or depth makes sloping to the allowable angle impractical.

7. Sloping:

- 7.1 Maximum allowable slopes for excavations less than 20' based on soil type and angle to the horizontal are as follows:
- 7.1.1 Type B soil must have walls sloped to a maximum angle of 45-degrees (1:1 slope) from horizontal in all directions.
- 7.1.2 Type C soil, must have walls sloped at a maximum angle of 34-degrees (1:1.5 slope) from horizontal in all directions.

8. Benching:

- 8.1 In Type B soil, the vertical height of the benches must not exceed 4 feet. Benches in increments of 2 feet or less is preferred. The angle developed by the edge of the benches must not exceed the maximum allowable slope for that soil type (Type B soil 45-degrees).
- Benching is not permitted in Type C soil.***

9. Shielding:

- 9.1 Trench boxes or trench shields are intended to protect workers from cave-ins and similar incidents. The trench shield is lowered into the excavation and workers may then enter the protected area within the shield. Only trench shields designed or certified by a registered professional engineer may be used. The use is limited to those trenches for which the shield is certified

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(e.g. maximum depth and material). The manufacturer must approve any modifications to the shields. The excavated area between the outside of the trench box and the face of the trench should be as small as possible. The space between the trench box and the excavation side should be backfilled to prevent lateral movement of the box. Trench boxes may be used in combination with sloping and benching. The box must extend at least 18 inches above the surrounding area if there is sloping toward the excavation. This can be accomplished by providing a benched area adjacent to the box. Type B soil 1:1 Type C Soil 1:1.5

- 9.2 Shields may be placed two feet above the bottom of an excavation, provided they are calculated to support the full depth of the excavation and there is no caving under or behind the shield. Workers must enter and leave the shielded area in a protected manner, such as by a ladder or ramp. Workers may not remain in the shielded area while it is being moved.

10. Shoring:

- 10.1 Hydraulic shoring is permitted as workers do not have to enter the trench to install it. It is gauge-regulated and ensures even distribution of pressure along the trench line and can be adapted to various trench depths and widths. All shoring shall be installed from the top down and removed from the bottom up. Hydraulic shoring shall be checked at least once per shift for leaking hoses and/or cylinders, broken connections, cracked nipples, bent bases, and any other damaged or defective parts. The top cylinder of hydraulic shoring shall be no more than 18 inches below the top of the excavation. The bottom of the cylinder shall be no higher than four feet from the bottom of the excavation. (Two feet of trench wall may be exposed beneath the bottom of the rail or plywood sheeting, if used.)
- 10.2 Three vertical shores, evenly spaced, must be used to form a system. Wales are installed no more than two feet from the top, no more than four feet from the bottom, and no more than four feet apart, vertically.

11. Inspections:

- 11.1 Frequent inspection of the excavation and surrounding area by the Competent Person is critical to ensure the safety of the workers involved in work within the trench. The Competent Person must conduct inspections of the entire excavation site:

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- 11.1.1 Daily and before the start of each shift.
- 11.1.2 As dictated by the work being done in the trench.
- 11.1.3 After every rain storm.
- 11.1.4 When fissures, tension cracks, sloughing, undercutting, water seepage, bulging at the bottom, or other similar conditions occur.
- 11.1.5 When there is a change in the size, location, or placement of the spoil pile.
- 11.1.6 When there is any indication of change or movement in adjacent structures.

12. Temporary spoil:

12.1 Shall be placed no closer than 2 feet from the surface edge of the excavation. The distance is measured from the nearest base of the spoil to the cut. This distance should not be measured from the crown of the spoil deposit. This distance requirement ensures that loose rock or soil from the temporary spoil will not fall on employees in the trench. The spoil should be placed so that it channels rainwater and other run-off water away from the excavation. Spoil should be placed so that it cannot accidentally run, slide, or fall back into the excavation.

13. Surface Crossing of Trenches:

- 13.1** Surface crossing of trenches should not be made unless absolutely necessary. However, if necessary, they are only permitted under the following conditions:
- i. **Vehicle crossings** must be designed by and installed under the supervision of a registered professional engineer.
 - ii. **Walkways or bridges** must have a minimum clear width of 20 inches, be fitted with standard rails, and extend a minimum of 24 inches past the surface edge of the trench.

14. Ingress and Egress:

- 14.1** Trenches 4 feet or more in depth shall be provided with ladders or other fixed means of egress. Spacing must be such that a worker will not have to travel more than 25 feet to the nearest means of egress. Ladders must be secured and extend a minimum of 36 inches above the landing. Metal ladders are not permitted.

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15. Exposure to Vehicles:

15.1 Employees exposed to vehicular traffic shall be provided with and required to wear reflective vests or other suitable garments marked with or made of reflectorized or high-visibility materials. Trained flag persons, signs, signals, and barricades shall be used when necessary.

16. Exposure to Falling Loads:

16.1 Employees are not allowed in the excavation while heavy equipment is digging. Employees must not work under loads being lifted or moved by heavy equipment used for digging or lifting. Employees are required to stand away from equipment that is being loaded or unloaded to avoid being struck by falling materials or spillage.

17. Hazardous Atmospheres and Confined Spaces - Testing for Atmospheric Contaminants

17.1 If there is any possibility that the trench or excavation could contain a hazardous atmosphere, atmospheric testing must be conducted prior to entry. Conditions that might warrant atmospheric testing would be if the excavation was made in a landfill area or if the excavation is adjacent to sources of contamination (e.g. sewage or fuel leaks). Testing shall be conducted before employees enter the trench and should be done continuous to ensure that the trench remains safe. Employees required to wear respiratory protection must be trained, fit-tested, and medically qualified.

18. Trenches and excavations with hazardous concentrations of airborne contaminants or oxygen deficient atmospheres qualify as confined spaces. When this occurs, compliance with Therma's Confined Space Program is also required.

18.1 Employees shall not be permitted to work in hazardous and/or toxic atmospheres. These include atmospheres with:

18.1.1 Less than 19.5% oxygen.

18.1.2 A combustible gas concentration greater than 20% of the lower flammable limit.

18.1.3 Concentrations of hazardous substance that exceed those specified in the threshold.

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18.2 Limit Values for airborne contaminants established by the ACGIH.

19. Standing Water and Water Accumulation:

19.1 Workers must not enter or work in excavations with standing water or in which water is accumulating unless adequate protection is provided. Protective methods for these circumstances must include:

19.1.1 Use of special support or shield systems approved by a registered professional engineer.

19.1.2 Water removal equipment used and monitored by a competent person.

19.1.3 Safety harnesses and lifelines used in conformance with 29 CFR 1926.104.

19.2 During rainstorms employees must exit the trench. The excavation must be carefully inspected by a competent person after each rain and before employees are permitted to re-enter the trench. Protective measures such as diversion ditches and dikes should be used to limit surface runoff water from entering the excavation.

THERMA TRENCH INSPECTION AND ENTRY AUTHORIZATION FORM

LOCATION:				JOB #:		DATE:	
TIME OF INSPECTION:				USAN#:			
WEATHER CONDITIONS:				OSHA NOTIFICATION: <input type="checkbox"/> Yes <input type="checkbox"/> No		TEMP.:	
SUPERVISOR:				COMPETENT PERSON:			
DIMENSIONS:		DEPTH =		HAZARDOUS CONDITIONS			
		TOP = W L		<input type="checkbox"/> <input type="checkbox"/>Saturated soil / standing or seeping water			
		BOTTOM = W L		<input type="checkbox"/> <input type="checkbox"/>Cracked or fissured wall(s)			
SOIL TYPE:		TESTED:		<input type="checkbox"/> <input type="checkbox"/>Bulging wall(s)			
<input type="checkbox"/> Type A Solid rock (most stable)		<input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> <input type="checkbox"/>Floor heaving			
<input type="checkbox"/> Type B		<input type="checkbox"/> Thumb		<input type="checkbox"/> <input type="checkbox"/>Utilities Supported			
<input type="checkbox"/> Type C (loose sand or fill)		<input type="checkbox"/> Penetrometer		<input type="checkbox"/> <input type="checkbox"/>Super-imposed loads			
<input type="checkbox"/> Previously Disturbed				<input type="checkbox"/> <input type="checkbox"/>Vibration Near Excavation			
<input type="checkbox"/> Cohesive <input type="checkbox"/> Non-cohesive				<input type="checkbox"/> <input type="checkbox"/>Ventilation Required			
PROTECTION METHODS:				PLACEMENT OF SPOILS & EQUIPMENT			
<i>(Walls MUST be vertical—NO voids)</i>				<input type="checkbox"/> <input type="checkbox"/>Spoils at least 2 feet from edge of trench			
SHORING				<input type="checkbox"/> <input type="checkbox"/>Subject to surcharge from equipment			
<input type="checkbox"/> Timber				<input type="checkbox"/> <input type="checkbox"/>Backhoe at end of trench			
<input type="checkbox"/> Pneumatic				<input type="checkbox"/> <input type="checkbox"/>Compressor, etc. at remote location			
<input type="checkbox"/> Hydraulic				LADDER LOCATION			
<input type="checkbox"/> Screw Jacks				<input type="checkbox"/> <input type="checkbox"/>Located in protected area			
				<input type="checkbox"/> <input type="checkbox"/>Within 25 feet of safe travel			
SHIELDING / SLOPING or BENCHING				<input type="checkbox"/> <input type="checkbox"/>Secured			
<input type="checkbox"/> Trench Box				<input type="checkbox"/> <input type="checkbox"/>Extends 36 inches above the landing			
<input type="checkbox"/> Sloping/Bench: B 1:1 (45°) C 1 ½:1 (34°)				<input type="checkbox"/> <input type="checkbox"/>Leads to safe landing			
ENVIRONMENTAL CONDITIONS:				OTHER:			
<input type="checkbox"/> <input type="checkbox"/> Air Monitor used?				<input type="checkbox"/> <input type="checkbox"/> Shoring equipment inspected prior to use?			
<input type="checkbox"/> <input type="checkbox"/> Confined space permit issued?				<input type="checkbox"/> <input type="checkbox"/> Is trench SAFE to enter?			
DATE	INSPECTED BY:		INITIALS	DATE	INSPECTED BY:		INITIALS
NOTE: All unsafe conditions must be corrected prior to trench entry. If any hazardous conditions are observed, the trench must be immediately evacuated and no one allowed to re-enter until corrective action has been taken.				ENTRY AUTHORIZED BY: (COMPETENT PERSON)			

SOILS ANALYSIS CHECKLIST

This checklist must be completed when soil analysis is made to determine the soil type(s) present in the excavation. A separate analysis must be performed if the excavation (trench) is stretched over a distance where soil type changes.

Site Location:		
Date:	Time:	Competent Person:
Location where sample was taken:		
Type of protective system used:		

VISUAL TEST

<u>VISUAL TEST</u>			
Particle Type:	Fine grained (cohesive) <input type="checkbox"/>	Granular (sand/sift or gravel) <input type="checkbox"/>	
Water Conditions:	Wet <input type="checkbox"/>	Dry <input type="checkbox"/>	Seeping Water <input type="checkbox"/> Surface water present <input type="checkbox"/> Submerged <input type="checkbox"/>
Previously disturbed soils:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
Underground utilities:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
If Yes, what type:			
Layered soils? (Note: The less stable layer controls soil type.)	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
Layered soils dipping into excavation:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Unknown <input type="checkbox"/>
Excavation exposed to vibration:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
If Yes, from what?			
Crack-like openings or spalling observed:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
Conditions that may create a hazardous atmosphere:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
If Yes, identify condition and source:			
Surface encumbrances:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	If Yes, what type?
Work to be performed near public vehicular traffic:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
Possible confined space exposure:	Yes <input type="checkbox"/>	No <input type="checkbox"/>	

MANUAL TEST

Plasticity:	Cohesive <input type="checkbox"/>	Noncohesive <input type="checkbox"/>
Dry Strength:	Granular (crumbles easily) <input type="checkbox"/>	Cohesive (broken with difficulty) <input type="checkbox"/>
Wet Shake:	Water comes to surface (granular material) <input type="checkbox"/>	Surface remains dry (clay material) <input type="checkbox"/>

Note: The following unconfined compressive strength tests should be performed on undisturbed soils. **Thumb Test** used to estimate unconfined compressive strength of cohesive soil.

Test performed:	Yes <input type="checkbox"/>	No <input type="checkbox"/>
<input type="checkbox"/>	Type A – soil indented by thumb with very great effort.	
<input type="checkbox"/>	Type B – soil indented by thumb with some effort.	
<input type="checkbox"/>	Type C – soil easily penetrated several inches by thumb with little or no effort. (If soil is submerged, seeping water, subjected to surface water, runoff, exposed to wetting.)	

Penetrometer or Shearvane used to estimate unconfined compressive strength of cohesive soils.

Test performed:	Yes <input type="checkbox"/>	No <input type="checkbox"/>
<input type="checkbox"/>	Type A – soil unconfined compressive strength of 1.5 tsf or greater.	
<input type="checkbox"/>	Type B – soil with unconfined compressive strength greater than 0.5 tsf and less than 1.5 tsf.	
<input type="checkbox"/>	Type C – soil with unconfined compressive strength of 0.5 tsf or less. (If soil is submerged, seeping water, subjected to surface water, runoff, exposed to wetting.)	

Note: Type A – no soil is type A if soil is fissured, subject to vibration, previously disturbed, layered, dipping into excavation on a slope of 4H:1V.

SOIL CLASSIFICATION

Stable Rock <input type="checkbox"/>	Type A <input type="checkbox"/>	Type B <input type="checkbox"/>	Type C <input type="checkbox"/>
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SELECTION OF PROTECTIVE SYSTEM (Appendix F)

Protective System:	<input type="checkbox"/>	Sloping (Appendix B)	Specify angle:
	<input type="checkbox"/>	Timber shoring (Appendix C)	
	<input type="checkbox"/>	Aluminum hydraulic shoring (Appendix D)	
	<input type="checkbox"/>	Trench shield – maximum depth in this soil	

Note: Although OSHA will accept the above tests in most cases, some states will not. Check your state safety requirements for trenching regulations.

SKID STEER LOADER DAILY INSPECTION CHECKLIST



To be completed **DAILY** by the operator or authorized person **BEFORE** each use.

Make:	Model:			Unit#:			
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Date:							
Hour Meter Reading:							
Operator/Inspector:							

For each "Inspection Item," indicate one of the following: P=Pass F=Fail N/A=Not Applicable

Note general vehicle condition. Clear away all collected debris and clean if necessary. Check for mechanical damage and loose or leaking components. Report faults to your supervisor.

Before starting engine, check the following:								
VISUAL INSPECTION	M	T	W	Th	F	S	Su	Comments Explain 'F'
Engine (check oil level & for leaks)								
Fuel tank (drain off moisture & sediment)								
Hydraulic tank (check oil level & for leaks)								
Radiator (check coolant level & for leaks)								
Air cleaner (check indicator, clean or change A/R)								
Engine belts (check for adjustment/wear)								
Fuel filter (service when gauge indicates low pressure)								
Wheels & tire assemblies (condition/pressure)								
Lubricate chassis (refer to lube chart, as required)								
After starting engine, check the following:								
START-UP ITEMS	M	T	W	Th	F	S	Su	Comments Explain 'F'
Engine (does it sound normal?)								
Instruments (check for normal readings)								
Controls (check for normal operation)								
Exhaust system (check for leaks & excessive smoke)								
Lights & horn								
Back-up alarm								

Note: Any item not checked requires the unit be taken out of service until the problem is corrected.

REPORT ALL DEFECTS TO YOUR SUPERVISOR/FOREMAN IMMEDIATELY

General Comments:

EXCAVATOR DAILY INSPECTION CHECKLIST



To be completed **DAILY** by the operator or authorized person **BEFORE** each use.

Make:	Model:		Unit#:				
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Date:							
Hour Meter Reading:							
Operator/Inspector:							

For each "Inspection Item," indicate one of the following: P=Pass F=Fail N/A=Not Applicable

1. Pre Start-up Walk-around	M	T	W	Th	F	S	Su	2. Start-up	M	T	W	Th	F	S	Su
Safe area/equipment secured								Seatbelt inspected and							
Undercarriage								Engine sounds normal							
Track shoes/Wheels & Tires								Instrument panel							
Rollers								Oil pressure							
Sprockets								Coolant Temperature							
Idler wheels								Hour meter							
Track links								3. Powered Systems	M	T	W	Th	F	S	Su
Turntable/Slewing assembly								Lights							
Turret								Horn							
Cab								Wipers							
Glass								Fan/Heater/Air conditioner							
Doors								Radio/Accessories							
Emergency exit								Hydraulic Controls							
Entry/exit steps								Drive							
ROPS/FOPS/TOPS								Steer							
Counterweight bolts								Turret rotate							
Lights								Boom							
Mirrors								Dipper/Stick							
Engine/Engine compartment								Work attachment							
Fluid levels								Accessories							
Leaks								4. General	M	T	W	Th	F	S	Su
Belts/Hoses								Housekeeping							
Radiators/Coolers								Fire extinguisher							
Fire suppression system								Manufacturer's manuals							
Digging Assembly								Log Book							
Boom								Decals/Warnings/Placards							
Dipper/Stick								Certification/Capacity labels							
Work attachment								Level indicator							
Articulated joints								Report any problems to your supervisor. ALWAYS tag out unsafe equipment. Comments: <i>Explain 'F'</i>							
Hydraulics															
Fluid level															
Leaks															
Cylinders															
Pins/Locks															
Fittings															
Hoses															

Safety Manual Lockout / Tagout Program

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Revision No.: 3

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Revision Date: 11-16
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Lockout / Tagout Program

1. Purpose and Scope

- 1.1 This is a statement of official THERMA policy to establish the process for compliance with the Occupational Safety and Health Administration (OSHA) regulation, "Control of Hazardous Energy", 29 CFR 1910.147. It is intended to protect employees from the hazards caused by the inadvertent activation of equipment or systems while work is performed on it/them. This policy establishes the minimum requirements to protect employees from such hazards.

2. Responsibility

- 2.1 It is the duty of all Foremen, Project Managers, and Supervisors to enforce this policy.
- 2.2 It is the duty of all employees to follow these procedures.
- 2.3 Enforcement of this policy shall be part of the daily safety audit.
- 2.4 It is the responsibility of the safety department manager to perform an annual review of the LOTO policy to ensure the procedures and requirement of the program are being followed. This inspection shall be documented.

3. Policy

- 3.1 Servicing, maintenance or construction which takes place during normal production operations is covered by this plan if:
 - a. An employee is required to remove or bypass a guard or safety device; or
 - b. An employee is required to place any part of his or her body into an area of the machine, piece of equipment or system where work is actually performed upon the material being processed (point of operation); or
 - c. Where an associated danger exists during a machine or system cycle
- 3.2 Minor tool changes and adjustments (e.g., clearing jammed paper from a copier, printer or typewriter) and other minor servicing activities, which are routine, repetitive, and take place during normal production operations, are not covered by this
- 3.3 This plan also does not apply to work on cord and plug connected electrical equipment for which exposure to the hazards of unexpected start-up is

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controlled by unplugging it from the energy source if the plug is under the exclusive control of the employee performing the service.

4. Application

- 4.1 The Lockout/Tagout Plan shall be implemented for all facilities where THERMA personnel work, and there is need to perform maintenance, construction or provide routine service to machinery or equipment.
- 4.2 Servicing of all electrically, chemically, pneumatically, thermally and/or hydraulically powered machinery and systems is included in this plan.
- 4.3 Contractors who perform work for THERMA shall also comply with the procedures outlined in this plan.

5. Special Circumstances

- 5.1 Job sites that present unique circumstances will require Supervisors and Foremen to develop safety plans specifically designed for that site.
- 5.2 THERMA's safety department is available to assist in the development of these plans.

6. Definitions

- 6.1 Affected personnel: Persons that may use the machine or system being serviced or worked on during the course of their work day and may attempt to activate machinery while service is being done. Affected persons also include those persons whose job requires working in an area while such servicing, maintenance or construction is being performed.
- 6.2 Authorized personnel: Persons that have received training in the use of Lockout/Tagout equipment and are authorized to perform maintenance, service or construction. Authorized personnel also include those persons responsible for properly locking and tagging machinery that is to be serviced. (Affected personnel may also be authorized personnel when that employee's duties include servicing, maintenance or construction on the machinery or system.)
- 6.3 Blank: A disk inserted into the space between two pipe flanges to prevent the passage of liquid or gases through a pipe.
- 6.4 Bleed: The release of stored hydraulic, electrical, pneumatic, or other form of energy.
- 6.5 Energy Sources: Any source of electrical, pneumatic, hydraulic, thermal, chemical, magnetic, gravitational or other type of energy.

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- 6.6 Lock: Keyed device used to secure equipment. For a lock to qualify as a Lockout device, only one key shall be available to the lock, and that lock shall stay in the possession of the affected person. Locks issued for use with this plan shall not be used for other purposes. Additionally, locks shall be able to withstand the environment in which they are being used, and a reasonable amount of force shall be required to remove the lock without the key, for example, bolt cutters, etc.
- 6.7 Lockout: A system in which a lock, when properly attached to a power or energy source, prevents the unintentional activation of equipment or systems. The lock will physically hold the switch or handle in the "off" position until it is removed by the authorized personnel. A Lockout may include a device which allows specific types of switches and valves to have a lock applied to the control system. The device may also allow multiple locks to be applied, so that more than one affected person is able to place their one-key lock to the device.
- 6.8 Lockout/ Tagout Procedures: A list of procedures, abbreviated as LOTO, designed and implemented to protect employees from an accidental discharge of energy. LOTO is used interchangeably with, "Control of Hazardous Energy".
- 6.9 Tagout: A tagging procedure, intended to act only as a warning device, used to prevent the unintentional activation of equipment. The tag will read "DO NOT OPERATE". All tags and attachment means shall also be made to withstand the environment in which they are being used, including any written instructions or information on them. Tags shall contain, at a minimum, the name of the person placing the tag, the name of the company they work for, and a contact method, such as a phone or radio number
- 6.10 Supervisor/Multiple Lockout: In most Lockout/Tagout procedures, each individual shall place their own personal lock on the energy isolating device. The supervisor (Foreman) of the crew may lock out the machine, equipment, or system using a Lock Box. Under this procedure the Supervisor takes responsibility for locking all valves, switches and controls with a one-key one-lock system, reviews the lockout with his/her crew, and places the key in a box. The other members of the crew then place their one-key, one lock system on the box, insuring that the locked out system can't be started or opened without all members of the crew removing their locks. The Supervisor shall be the only person authorized to place or remove the lockouts after the crew has removed their locks from the lock box, and the Supervisor shall ensure that all personnel are safe prior to energizing of the machine, equipment, or system. The Supervisor in charge of the lockout procedure may not leave the immediate area where the crew is working during the lockout.

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- a. **NOTE:** When a Supervisor lockout procedure is used, a member of the THERMA safety department must be notified prior to the start of the procedure.

7. Training

- 7.1 All new employees are given an orientation that includes Lockout/Tagout procedures. All employees required to service, maintain, or perform construction on machinery or systems that have the potential for release of hazardous energy shall be provided with additional training that includes review of this policy and shall take the LOTO quiz. Personnel shall be re-trained every three years in LOTO. In this additional training, employees shall be informed of:
 - a. The location and availability of the LOTO Plan.
 - b. The procedures covered by the LOTO Plan.
 - c. Explanations of provisions.
 - d. Description of physical hazards common to inappropriate locking and tagging of machinery.
 - e. Review of measures to protect employees, customers, and visitors from the inadvertent release of hazardous energy.
 - f. Discussion of procedures to de-energize equipment and release or secure all residual energies.
 - g. Evaluation technique to determine if energy hazards are present.
- 7.2 Retraining shall be provided for all authorized and affected employees every three years or whenever:
 - a. There is a change in their job assignment.
 - b. There is a change in machines, equipment or processes that present new hazards.
 - c. There is a change in the energy control procedure.
- 7.3 When Lockout/Tagout training takes place the records shall be sent to the Director of Safety and Health at the corporate office. A copy of the training, along with any applicable documents, such as a Pre-Task Plan, shall be kept in the Supervisor's records at the job site, or with the job file. The Safety Department member conducting the training shall enter the date of training the employees THERMA Training Record hand book in the appropriate section.

8. Conditions

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- 8.1 Locking devices and tags shall be used when employees are performing maintenance, service or construction on or to any machine or system where unexpected or unintentional motion/release of energy could cause harm.
- 8.2 Locking devices shall also be used when guards or other safety devices must be removed during service or when moving or energized parts put any part of the employee's body at risk of injury.
- 8.3 Examples of conditions where locking and tagging should be used may include, but are not limited to:
 - a. Clearing blocked or jammed mechanical equipment.
 - b. Maintenance or repair work on equipment with moving parts.
 - c. Confined Space entries.
 - d. Repairs or installation of electrical equipment.
 - e. Construction on pipe systems containing hazardous substances.
- 8.4 **Note:** If the equipment being serviced must be temporarily re-activated (for example, to test the equipment as part of the installation) the following sequence of actions shall be followed:
 - a. Clear the machine or equipment of tools and materials
 - b. Remove employees from the machine or equipment area
 - c. Remove the LOTO device
 - d. Energize and proceed with testing or positioning
 - e. De-energize all systems and reapply energy control measures
- 8.5 Specific instructions shall be developed using THERMA'S Pre Task Plan (PTP) for the locking and tagging of machinery, equipment or systems under the following conditions:
 - a. When the machine, equipment, or system being serviced has the potential for stored or residual energy, or the re accumulation of stored energy after shut down.
 - b. When the machine, equipment, or system has multiple energy sources.
 - c. When the isolation and locking of the machine, equipment, or system will not completely deactivate it.
 - d. When the machine, equipment, or system cannot be locked out.
 - e. When a single lockout device will not achieve a lockout condition.
 - f. When the lockout device will not be under the exclusive control of the authorized employee performing the service.

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- 8.6 If a lock cannot be applied to the equipment, and the supervisor can demonstrate that the tagging procedure will provide a level of safety equivalent to that obtained by the use of a lock, a tag may be used instead. A tag used without a lock shall be supplemented by one additional safety measure, such as:
- The removal of an isolating circuit element.
 - Blocking of a control switch.
 - Opening of an extra disconnecting device.
 - The removal of a valve handle.
 - The use of a block-off plate or "blank" inserted between flanges on a pipe system.
- 8.7 The tagout device shall be attached to the same location that the lockout device would have been attached, and shall have the name of the person that attached the tag, the estimated length of time the tagout will be in effect, and a suitable communication procedure for contacting the person that placed the tagout, such as a cell phone number.
- 8.8 In addition the THERMA Safety Department shall be contacted and informed of the procedure, including an explanation of why a lock cannot be used to render the machine, equipment or system safe.

9. General LO/TO Procedures

- 9.1 Lockout or tagout shall be performed only by authorized employee(s) who are performing the servicing or maintenance.
- 9.2 The customer representative shall be notified prior to shut down and LOTO. Notification shall contain the name and job titles of authorized employees, location of equipment being serviced, and duration/date of service.
- 9.3 Basic energy control procedures:
- "Preparation for shutdown." Before an authorized or affected employee turns off a machine or equipment, the authorized employee shall determine where and how equipment is being energized. Since some equipment is powered by several sources e.g., electrical, mechanical, pneumatic, chemical, thermal and hydraulic), all energizing sources shall be identified. For complex equipment, refer to the manufacturer's control diagram detailing the locations of all isolating points. These points may include breaker panels, switches and valves. Furthermore, possible residual energy and methods used to dissipate or restrain that energy shall be identified. In addition to identifying energy sources, the employee must determine the magnitude of the energy, the hazards of the energy to be controlled and the methods or means to control the energy. If authorized employees are

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unable to determine each form of energy, they must consult their supervisor and/or the Safety Department before work is started.

- For complex Lockout/Tagout procedures use the attached LOTO checklist. Complete each section, entering "N/A" for those areas and sections that are not applicable.
- b. "Machine or equipment shutdown." The machine or equipment shall be turned off or shut down using the procedures established for the machine or equipment (depress the stop button, open the switch, close valve, etc.). An orderly shutdown must be utilized to avoid any additional or increased hazard(s) to employees as a result of the equipment stoppage.
 - c. "Machine or equipment isolation." All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).
 - d. "Lockout or tagout device application." Attach a lock and tag, of designated color, type and descriptive warning, on each disconnecting means used to de-energize circuits and equipment on which work is to be performed. The lock shall be attached to prevent persons from operating the equipment. Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use. Additionally, tags shall be attached to all points where equipment or circuits can be energized. If multiple employees are servicing the same equipment, each shall attach their own lock to a multiple lock plate.
 - If a Supervisor lockout/tagout procedure is used, the Supervisor shall ensure that all machines, equipment, and systems are locked/tagged out, that the Supervisor's key is placed in a Lock Box, and all personnel are out of danger before testing for stored energy. **Note:** No attempt shall be made to remove another employee's lock.
 - e. "Stored energy." Following the application of logout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe. If there is a possibility of reaccumulation of stored energy to a hazardous level, verification of isolation shall be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.
 - If energy is incapable of being released, the authorized employee shall reposition, block, utilize a blank or utilize some other

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protective measure to prevent the release of residual energy while service is in progress.

- f. "Verification of isolation." Prior to starting work on machines or equipment that have been locked out or tagged out, the authorized employee shall verify that isolation and deenergization of the machine or equipment have been accomplished. This should be done by:
- Checking that no personnel are exposed.
 - Verifying the isolation of equipment by operating the push button or other normal operating controls.
 - Secure all switches to prevent movement to the "on" or "start" position.
 - Checking pressure gauges to ensure de-pressurization of lines.
 - Inspect electrical circuits to confirm zero voltage.
 - Open bleeder valves to verify pressure is released, while protecting against the release of hazardous materials.

10. Re-Energization Procedures

- 10.1 Authorized employees will follow these essential steps before lockout or tagout devices are removed and energy is restored to the machine or equipment:
- a. Ensure that nonessential items have been removed and to ensure that machine or equipment components are operationally intact.
 - b. Work area checked to ensure that all employees are safely positioned.
 - c. Remove each lockout or tagout device from the energy isolating device(s). This shall be completed by the employee who applied the device.
 - d. Notify personnel that the LO/TO devices have been removed.
- 10.2 If the authorized employee who applied the device is not available to remove it, that device may be removed by another authorized employee, with Manager approval, and the following:
- a. Verification that the authorized employee who applied the device is not at the facility:
 - b. Reasonable efforts were made to contact the authorized employee to inform him/her that his/her lockout or tagout device has been removed; and

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- c. The authorized employee has this knowledge before he/she resumes work at that facility.

11. Testing or Positioning of Machines, Equipment or Components

- 11.1 In situations where lockout or tagout devices must be temporarily removed to test or position the machine, equipment or component, the following sequence of actions shall be followed:
 - a. Clear the machine or equipment of tools and materials;
 - b. Remove employees from the machine or equipment;
 - c. Remove the lockout or tagout devices;
 - d. Energize and proceed with testing or positioning;
 - e. Deenergize all systems and reapply energy control measures to continue the servicing and/or maintenance.

12. Group Lockout or Tagout

- 12.1 When servicing and/or maintenance is performed by a crew, craft, department or other group, this is considered a group lockout or tagout and shall include the following specific requirements:
 - a. Primary responsibility is vested in an authorized employee for a set number of employees working under the protection of a group lockout or tagout device;
 - b. The authorized employee shall review the exposure status of individual group members; Assignment of overall responsibility to an authorized employee designated to coordinate affected work forces and ensure continuity of protection;
 - c. Each authorized employee shall affix a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when he or she begins work, and shall remove those devices when he or she stops working on the machine or equipment being serviced or maintained.

13. Shift or Personnel Changes

- 13.1 Specific procedures shall be utilized during shift or personnel changes. This ensures the continuity of protection, including provisions for the orderly transfer of lockout or tagout device protection between off-going and oncoming employees

14. Outside Personnel

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- 14.1 Whenever outside servicing personnel are to be engaged in activities requiring LOTO, Therma and the outside employer shall inform each other of their respective lockout or tagout procedures. Therma shall ensure that his/her employees understand and comply with the restrictions and prohibitions of the outside employer's energy control program.

15. Addendum For the Use of a Lock Box in Lockout Situations

- 15.1 The following procedure shall be followed when establishing a lock box situation. This procedure will only be implemented by a Foreman, General Foreman, Project Manager, or the designated Safety Coordinator for the job site. Whenever a lock box is used the Therma Safety Department will be notified prior to use.
- The General Foreman and Foreman are responsible to have all check off lists, hot work permits, pre-task plans or any other required paper work at the same location as the lock box while the work is performed.
 - The General Foreman and Foreman for the work area shall identify the energy sources that are to be locked out to isolate the system, and shall place a lock on each energy source that has only one key, retained by the person applying the lock. At no time shall any lock be used that has more than one key.
 - All energy sources shall be entered on the check off list as each is locked out, giving the number, location, etc.
 - The General Foreman, Foreman and crew shall verify that all sources of hazardous energy have been locked out and tagged properly. The tag(s) will indicate the company, person(s) who locked the system out, and shall have a contact phone or radio number on the tag.
 - All systems that are locked and tagged shall be verified for absence of hazardous energy. The General Foreman, Foreman, and crew shall be present while verification takes place.
 - Any member of the team working on the system shall have the duty to raise questions about the presence of hazardous energy, and shall not work on the system until all are satisfied that it is safe.
 - The General Foreman and/or Foreman shall place the key(s) used to lock the system(s) into a lock box that has multiple lock locations on it, or uses a multiple lock hasp to secure it.
 - All Personnel that will work on the system(s) shall place their key(s) on the lock box. The lock box must be locked by all members of the team in such a way that any one lock left on the box will prevent it from opening.

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- i. When the worker has finished work on the system, or at the end of the work shift, they will remove their lock from the lock box. Any person that leaves a job site while their lock is on the lock box is in violation of THERMA'S policy. If the system is to remain locked until the next work shift, the General Foreman or Foreman shall have the facility personnel put their lockout system(s) on and take possession of the procedures. When work resumes, the process of lockout, tagout, verification, and lockbox procedure shall be repeated for that shift.
 - j. If a person participating in the lock box procedure leaves the site and the system must be re-activated, only the General Foreman, Foreman, or Safety Coordinator shall notify the person that their lock has been removed. Only then shall the General Foreman, Foreman or Safety Coordinator remove that person's lock. The person leaving the site will be subject to disciplinary action, unless it is determined that circumstances that required them to leave were justified.
 - k. The General Foreman, Foreman, or Safety Coordinator controlling the lockbox shall verify that it is safe to remove the locks, and then shall allow the crew to remove their locks. Only then will the system be re-activated.
- 15.2 These procedures or their equivalent shall be used in all Supervisor controlled lock box situations.



LOCKOUT/TAGOUT CHECKLIST

Prior to beginning work on machinery, equipment, or systems requiring Lockout/Tagout, check each item. If there are items that are not applicable to the entry, mark them "N/A".

Job Site:	Date:	Time:
Foreman:	Exp. Date:	Exp. Time:

PERSONAL PROTECTIVE EQUIPMENT

<input type="checkbox"/>	Hard Hat
<input type="checkbox"/>	Eye/Face Protection (type)
<input type="checkbox"/>	Protective clothing (type)
<input type="checkbox"/>	Gloves (type)
<input type="checkbox"/>	Respirator (type)
<input type="checkbox"/>	Fall protection / Other

SHUTDOWN & LOCKOUT

<input type="checkbox"/>	Electrical lockout/tagout completed
<input type="checkbox"/>	Valves closed, lockout/tagout completed
<input type="checkbox"/>	Lines blinded/blocked off
<input type="checkbox"/>	Lines disconnected
<input type="checkbox"/>	Line bleeders open
<input type="checkbox"/>	All hydraulic/pneumatic pressure released
<input type="checkbox"/>	All other energy released and/or guarded (magnetic, spring, gravity, reactivity)
<input type="checkbox"/>	Hot work permit completed
<input type="checkbox"/>	System/area check for flammables/vapors
<input type="checkbox"/>	Fire extinguisher on site/in area
<input type="checkbox"/>	Barricade/Exclusion Zone markers in place
<input type="checkbox"/>	Machine/Equipment/System users / other personnel notified

REACTIVATION

<input type="checkbox"/>	Electrical/System reconnected
<input type="checkbox"/>	Line blinds/block-offs removed
<input type="checkbox"/>	Line bleeders closed
<input type="checkbox"/>	Guards reinstalled
<input type="checkbox"/>	Tools/materials removed
<input type="checkbox"/>	Machine/Equipment/System users / other personnel clear and safe
<input type="checkbox"/>	Electrical lockout/tagout removed
<input type="checkbox"/>	Valve(s) lockout/tagout removed



WORK TEAM

Print	Initial
Foreman	
Safety	
Customer	

JOB COMPLETED

Date:	Time:
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Safety Manual Confined Space Program

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Revision No.: 1

Effective: 06-99
Revision Date: 01-09
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Confined Space Program

1. Purpose & Scope:

- 1.1 The Occupational Safety and Health Administration (OSHA) General Industry Standards for Confined Spaces 29 CFR 1910.146 requires a written program for employers to follow when conducting work in confined spaces. The following procedures are based on the requirements established by OSHA

2. Responsibility:

- 2.1 Director of Health and Safety
 - 2.1.1 The Director of Health and Safety shall ensure adequate training (with written records documenting the latest training) and equipment are provided.
 - 2.1.2 The Director of Health and Safety shall update this procedure and the various attachments to ensure compliance with OSHA standards and ensure that all copies of the attachments are updated.
 - 2.1.3 The Director of Health and Safety shall conduct and/or coordinate all training as related to this procedure and maintain all documented training records.
- 2.2 Site Safety Coordinators (those trained as Entry Supervisors) shall:
 - 2.2.1 Maintain the written entry permit system to ensure that affected employees comply with the relevant safety and health requirements during the performance of their duties and that they are provided with the proper equipment.
 - 2.2.2 When confined space entry is anticipated, information regarding the hazards in those spaces is to be gathered and shall be forwarded to the Site Safety Coordinator.
 - 2.2.3 The Site Safety Coordinator shall evaluate the space along with the responsible foreman and project manager to determine how the entry will be handled.

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2.3 The Entry Supervisor is responsible for the following:

- 2.3.1 Know the hazard(s) and potential hazards that may be encountered during entry. Information shall include:
 - a. The mode.
 - b. Signs or symptom.
 - c. Consequences of the exposure.
- 2.3.2 Determine the availability of a rescue team. Ensure that the means to summon the rescue team is operable.
- 2.3.3 List the names of all the entrants and attendants for each entry on the Entry Permit. If the Entry Supervisor will enter the confined space he/she must be listed as an entrant.
- 2.3.4 Ensure that all entrants have been trained in Confined Space Entry procedures including self rescue techniques to exit from the confined space.
- 2.3.5 Ensure that all tests specified by the permit have been conducted and recorded.
- 2.3.6 Ensure that the appropriate entries have been made on the permit.
- 2.3.7 Ensure that the permit space is isolated to the extent possible. If isolation of the permit space is not feasible because the space is large or part of a continuous system, entry conditions shall be continuously monitored in areas where authorized entrants are working.
- 2.3.8 Ensure that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin.
- 2.3.9 Sign the Entry Permit. Permits are not valid unless signed by the Entry Supervisor.
- 2.3.10 Terminate the entry and cancel the permit as required.
- 2.3.11 Remove unauthorized individuals who enter or attempt to enter the permit space during entry operations.

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2.3.12 Determine that entry operations remain consistent with the terms of the entry permit and that acceptable entry conditions are maintained.

2.3.13 Document on the Entry Permit or on a separate sheet, any incidents or circumstances requiring review of the confined space entry program. Sign the written documentation and if a separate sheet is used be sure that the permit number is written on the sheet and the sheet is attached to the Entry Permit. Such incidents include but are not limited to the following:

- a. Unauthorized entry or entry attempt.
- b. The detection of a condition/hazard not authorized by the permit.
- c. The occurrence of an injury or near-miss during entry.
- d. A change in use, configuration of the space reclassification from a permit required confined space to a non-permit required confined space.
- e. Entrant concerns about the entry (procedure, tools, etc.)
- f. Determines procedures for coordination of entry when personnel from multiple employers will work simultaneously.

2.3.14 When work is completed sign, remove, and file the canceled entry permit and all attachments.

2.3.15 If the permit space must be evacuated for any unacceptable condition, the entry supervisor shall:

- a. Order the entrants to exit the confined space.
- b. Note the unacceptable condition on the entry permit.
- c. Cancel the entry permit.
- d. Retain the canceled Entry Permit with all attachments for annual review.
- e. Correct the unacceptable condition if re-entry is planned. Document the corrective action.
- f. Verify the conditions in the confined space are acceptable if re-entry is planned.
- g. Issue a new Entry Permit before allowing re-entry.

2.4 The Attendant is responsible for the following:

2.4.1 Prior to worker entry into the confined space, the attendant shall have determined the location of the nearest functional telephone, and verified the working condition of the two-way radio or other means of communications in case of an emergency.

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- 2.4.2 Know the hazard(s) that may be encountered during entry. Information shall include:
- The mode.
 - Signs or symptoms.
 - Consequences of the exposure.
- 2.4.3 Is aware of possible behavioral effects of hazard exposure in authorized entrants.
- 2.4.4 Continuously maintains an accurate count of authorized entrants in the permit space and accurately identifies who is in the permit space. Records the names of any additional entrants. Records all times of entry and exit of each entrant.
- 2.4.5 **Remains outside of the permit space during operations until relieved by another attendant.**
- 2.4.6 Communicates with entrants continuously to monitor status and to alert entrants of the need to evacuate the space.
- 2.4.7 Monitors activities inside and outside the space and orders entrants to evacuate the space immediately under any of the following conditions:
- If the attendant detects a prohibited condition.
 - If the attendant detects the behavioral effects of hazard exposure in an authorized entrant.
 - If the attendant detects a situation outside the space that could endanger the authorized entrants.
 - If the attendant cannot effectively and safely perform his duties.
 - An evacuation alarm is sounded.
- 2.4.8 Notify the Entry Supervisor immediately after taking the emergency action required, of the emergency, unusual situations or conditions.
- 2.4.9 Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards.
- 2.4.10 Takes the following actions when unauthorized persons approach or enter a permit space while authorized entry is under way:

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- a. Warn the unauthorized persons that they must stay away from the permit space.
- b. Advise the unauthorized persons that they must exit immediately if they have entered the permit space.
- c. Inform the authorized entrants and the Entry Supervisor if unauthorized persons have entered the permit space.

2.4.11 Performs **non-entry** rescues.

2.4.12 Does Not Perform and May Not be assigned any duties that will interfere with the attendant's primary duty to monitor and protect the entrants.

2.4.13 Attendants may only monitor one confined space. Monitoring of multiple confined spaces is not allowed.

2.5 Entrants are responsible for the following:

2.5.1 Know the hazard(s) that may be encountered during entry. Information shall include:

- a. The mode.
- b. Signs and symptoms.
- c. Consequences of the exposure.

2.5.2 Communicating with the attendant continuously to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space.

2.5.3 Alert the attendant whenever:

- a. The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.
- b. The entrant detects a prohibited condition.

2.5.4 Exit from the permit space as soon as possible when:

- a. An order to evacuate is given by the attendant or the entry supervisor.
- b. The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.
- c. The entrant detects a prohibited condition.
- d. An evacuation alarm is activated.

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2.5.5 After the entry is completed, ensure that the confined space is clear and free of hazards. This includes but is not limited to the following:

- a. Removal of tools, equipment and debris from the confined space at the completion of the job.
- b. Confirm that all blinds are removed, all valves properly opened or closed, lines are properly reconnected, all locks and/or tags are removed and the space is completely ready to be returned to service.
- c. Clean the surrounding area.

3. DEFINITIONS

- 3.1 **ATTENDANT** - means an individual assigned to remain immediately outside the entrance to the confined space, to monitor authorized entrants, to perform all the attendant's duties assigned by this procedure and who may render assistance as needed to entrants inside the space without entering the space.
- 3.2 **BLIND, BLINDING or BLANKING** - means the absolute closure of a pipe, line or duct, to prevent passage of any material by fastening a solid plate or "cap" across the bore and which is capable of withstanding the maximum potential upstream pressure and temperature.
- 3.3 **CALIBRATION or RECALIBRATION** - means a laboratory or bench-top resetting of alarm points, spans and zeros, if applicable, according to manufacturer specifications. Calibration or re-calibration shall be conducted by a factory authorized service center, a factory trained technician, or a trained university technician.
- 3.4 **CONFINED SPACE** - means any space:
 - 3.4.1 That is large enough and so configured that an associate can bodily enter and perform assigned work.
 - 3.4.2 Not intended for continuous employee occupancy.
 - 3.4.3 Having a limited means for worker entry or exit due to the number, size or location of openings.
 - 3.4.4 That has doors and other portals through which a person could walk are not considered limited means for entry and exit. However, a space containing such a door or portal may still be deemed a confined space if an entrant's ability to escape in an emergency would be hindered.

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3.4.5 Note I: Confined spaces generally include, but are not limited to: storage tanks, bins, boilers, ventilation or exhaust ducts, sewers, manholes, underground utility vaults, tunnels and pipelines. Open top spaces more than four feet in depth such as: pits, tubs, and vaults may also be confined spaces.

- 3.5 **CPR** - Cardio-Pulmonary Resuscitation.
- 3.6 **DOUBLE BLOCK AND BLEED** - means the closure of a line, duct or pipe by locking and tagging a drain or vent to open to the atmosphere in the line between two locked-closed valves.
- 3.7 **ENGULFMENT** - means the surrounding and effective capture of a person by finely divided particulate matter or a liquid. There is potential for engulfment when such particulate matter or liquid exists in a sufficient quantity or at a sufficient pressure to surround a person before a normal exit can be effected.
- 3.8 **ENTRANT** - any associate who enters a confined space. **A QUALIFIED ENTRANT** is a person who:
 - 3.8.1 Has a valid need to enter a confined space.
 - 3.8.2 Has been trained as required by this procedure.
 - 3.8.3 Has been briefed on the hazards of the confined space and is properly protected from all such hazards by use of appropriate engineering controls or personal protective equipment.
- 3.9 **ENTRY** - means:
 - 3.9.1 Any action resulting in any part of the associate's body breaking the plane of an opening of the confined space.
 - 3.9.2 Includes any ensuing work activities inside the confined space.
 - 3.9.3 All periods of time that the confined space is occupied.
- 3.10 **ENTRY PERMIT** - means the written or printed document to allow and control entry into a permit space for a stated purpose during a specified time. The confined space entry permit must be properly completed prior to any confined space entry and must be posted at the portal of the confined space in use.
- 3.11 **ENTRY SUPERVISOR (QUALIFIED PERSON)** - means:
 - 3.11.1 A person who is trained in all aspects of this procedure and how to recognize the hazards of the confined space, how to evaluate

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those anticipated hazards, and shall be capable of specifying necessary control measures to ensure worker safety.

- 3.11.2 The person responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry, overseeing entry operations and for terminating entry.
- 3.11.3 The entry supervisor may or may not actually participate throughout the entry, but shall be on the scene during the issuance of any confined space entry permit and be readily available for consultation.
- 3.12 **EMERGENCY** - means any occurrence, internal or external to the permit space, of an event including the failure of hazard control or monitoring equipment that could endanger entrants.
- 3.13 **FIELD CHECKED** - means the checking of the accuracy of an instrument's response to a known concentration of a gas: a method of checking an instrument for a proper response in the field. It is a check of the instrument's functionality and is a pass/fail or go/no-go check. When an adequate response is not obtained, the equipment shall be removed from service and adjusted or repaired by a factory authorized service center or a factory trained technician.
- 3.14 **GROUND FAULT CIRCUIT INTERRUPTER (GFCI)** - means a device whose function is to interrupt the electric circuit to the load when a fault current to ground exceeds a predetermined value that is less than that required to operate the over-current protective device of the supply circuit.
- 3.15 **HAZARDOUS ATMOSPHERE** - means an atmosphere presenting a potential for death, disablement, injury, acute illness, or the inability to escape unaided from a permit space, from one or more of the following causes:
 - 3.15.1 A flammable gas, vapor, or mist in excess of 10% of its Lower Flammable Limit (LFL).
 - 3.15.2 An oxygen- deficient atmosphere containing less than 19.5% oxygen by volume or an oxygen enriched atmosphere containing more than 23.0% oxygen by volume.
 - 3.15.3 An atmospheric concentration of any substance listed in Subpart Z of Part 1910 Standards above the listed numerical value of the Permissible Exposure Limit (PEL). In the case of substances for which no PEL has been established, the Director of Health and

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Safety must be contacted to establish a safe atmospheric concentration prior to entry.

3.15.4 An airborne combustible dust at a concentration that obscures vision at a distance of 5 feet or less.

3.15.5 A concentration of an air contaminant that is considered Immediately Dangerous to Life or Health (IDLH) by any published source, including the manufacturer's Material Safety Data Sheet (MSDS).

3.15.6 A condition Immediately Dangerous to Life or Health (IDLH) as defined in this procedure.

3.16 HOT WORK - Work that produces arcs, sparks, flames, heat, or other sources of ignition. This includes but is not limited to burning, welding, grinding, riveting and space heating.

3.17 INTRINSICALLY SAFE - Equipment that is explosion proof and will not produce sparks or other ignition sources.

3.18 (IMMEDIATELY DANGEROUS TO LIFE AND HEALTH IDLH) - means any condition that poses an immediate or delayed threat to life, or which is likely to result in acute or immediately severe health effects or that would interfere with an individuals ability to escape unaided from a confined space.

NOTE: Only qualified personnel with proper protective equipment may be permitted to enter IDHL confined space.

3.19 IMMEDIATE SEVERE HEALTH EFFECTS - means that an acute clinical sign of serious, exposure-related reaction is manifested within 72 hours of exposure.

3.20 INERTING - displacement of the atmosphere by a nonreactive gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.

NOTE: This procedure (INERTING) produces an IDHL oxygen deficient atmosphere.

3.21 LFL - Lower Flammable Limit - the minimum concentration of a flammable gas or vapor in air (usually expressed in percent by volume at sea level), that will ignite if an ignition source is present.

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- 3.22 LINE BREAKING** - the intentional opening of a pipe, line or duct that is/or has been carrying flammable, corrosive or toxic material, an inert gas and/or fluid at a volume, pressure, or temperature capable of causing injury.
- 3.23 LOCKOUT OR TAGOUT** - means placing locks or tags on the energy isolating device(s). The key for any lock used for Lockout shall remain with the person working within the confined space.
- 3.24 OXYGEN DEFICIENT ATMOSPHERE** - an atmosphere containing less than 19.5 percent oxygen by volume.
- 3.25 OXYGEN ENRICHED ATMOSPHERE** - an atmosphere containing more than 23.0 percent oxygen by volume. (VOSH Standard.)
- 3.26 PEL** - Permissible Exposure Limit.
- 3.27 Permit Required Confined Space or Permit Space** - those spaces which meet the requirement of Confined space and which also pose health or safety hazards such as:
- 3.27.1 A current or potentially hazardous atmosphere.
 - 3.27.2 Potential worker entrapment (from inwardly converging walls or downward sloping floor).
 - 3.27.3 A potential for engulfment.
 - 3.27.4 Contains any other serious safety or health hazard.
- 3.28 PPE** - Personal Protective Equipment.
- 3.29 PURGING** - the method by which gases, vapors or other airborne contaminants are displaced.
- 3.30 RESCUE TEAM** - means those employees whom the Director of Health and Safety has designated and provided training to perform rescues from confined spaces PRIOR to any confined space entries. A rescue team from the local fire department will normally be the rescuers of choice PROVIDING THAT THE TRAINING REQUIREMENTS OF THIS PROCEDURE HAVE BEEN MET.
- 3.31 RETRIEVAL LINE** - means a line or rope secured at one end to a worker's safety belt, chest or body harness, or wristlets with the other end secured to an anchor point or lifting device located outside the entry

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portal. The anchor point shall not be a motor vehicle. Retrieval lines shall be of sufficient strength to remove an entrant when necessary.

3.32 **SCBA** - Self Contained Breathing Apparatus

3.33 **ZERO MECHANICAL STATE** - means that the mechanical potential energy of all portions of the machine or equipment is at its lowest practical value, set so that the opening of the pipe(s), tube(s), hose(s), or actuation of any valve, lever or button will not produce a movement which could cause injury.

3.34 **CONFINED SPACE IDENTIFICATION AND CLASSIFICATION:**

3.34.1 Entry Supervisors are responsible for:

- a. Identifying and classifying all confined spaces into which employees will enter. Entry is considered to have taken place as soon as any part of the entrant's body breaks the plane of an opening into the space.
- b. Identifying and providing written information as to the contents of the space, atmospheric conditions and rescue procedures. This information is to be forwarded to the Site Safety Coordinator for inclusion into Attachment A.

3.34.2 A permit required confined space is:

- a. A confined space that meets the stated definition.
- b. Contains or could contain a hazardous atmosphere.
- c. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross-section.
- d. Contains any other recognized serious safety or health hazard.
 1. If a space is not considered "permit required" but meets the criteria in this procedure, it must be considered permit required for entry.

4. **Reclassification:**

4.1 Although ALL confined spaces are initially considered "permit required confined spaces", certain spaces can be reclassified as "a non-permit confined space" provided the following apply:

4.1.1 Site specific approval of a qualified professional. (i.e.: Site Safety Coordinator, Entry Supervisor, etc.)

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- 4.1.2 All contaminants, vessels containing contaminants, and contaminated material have been removed.
- 4.1.3 All actual or potential atmospheric hazards have been eliminated and verified by testing.
- 4.1.4 Ventilation is not required to maintain control of atmospheric hazards.
- 4.1.5 All recognized hazards have been eliminated.
- 4.2 The Entry Supervisor shall document in writing on a separate sheet, the basis for reclassifying a permit required confined space to a non-permit required confined space, sign and date the statement, ref. the Entry Permit Number, and attach the sheet to the Entry Permit.
- 4.3 The space shall be reevaluated whenever the use or configuration of the space changes in any way that might increase the hazard to entrants. If necessary the space shall be reclassified to permit required confined space.
- 4.4 All entrants shall exit the space immediately when hazards are noted.
- 4.5 The Entry Permit and all attachments shall be posted at the portal to the confined space.

5 Entry Procedure:

- 5.1 Entering permit spaces is potentially one of the most dangerous jobs in the industry. Entry into a confined space shall be conducted only if necessary to do assigned work. Whenever possible assigned work shall be done from outside the space.
- 5.2 This Confined Space Entry Procedure shall be followed for entry into any defined confined space.
- 5.3 This procedure is to be used only by trained entry supervisors, entrants and attendants.
- 5.4 Hazards of entering confined spaces can be managed safely if the following principles and procedures are followed:
 - 5.4.1 Identify the confined space and develop a written work plan for isolating, clearing and entering the space.

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- 5.4.2 Isolate the space from all hazardous energy sources, production streams and/or energized equipment and stored pressure.
- 5.4.3 Empty, flush, purge, ventilate and clear the confined space (from the outside if possible).
- 5.4.4 Identify known and potential hazards or contaminants that may be found in the space.
- 5.4.5 Prohibit entry into the space until atmospheric testing is conducted and the applicable entry permit is completed, signed and posted at the portal to the space.
- 5.4.6 After the space has been removed from service and prior to entry, initial testing of the atmosphere shall be conducted.
- 5.4.7 When removing the space from service, the space shall be opened up as much as possible to allow for good ventilation.
- 5.4.8 After the applicable entry procedures have been conducted, an entrant, attendant or other trained person shall inspect the space to verify that all actions and conditions necessary for safe entry have been performed.
- 5.4.9 Any deficient areas shall be corrected before entry proceeds.
- 5.4.10 Once the inspection is completed, the entry supervisor who performed the inspection shall sign the entry permit.
- 5.4.11 Entry is prohibited until the permit has been completed satisfactorily and signed.
- 5.4.12 Ventilate the space to remove hazardous gases, vapors, dusts and fumes and then test the atmosphere with the ventilation system turned off.
- 5.4.13 Prepare the space, specifying the hazards that may be found, acceptable entry conditions, and required level of PPE to be used.
- 5.4.14 Prepare the Hot Work Permit as applicable if hot work is to be conducted in a confined space.
- 5.4.15 Review the work plans, hazards, safety requirements and PPE requirements with all entry personnel during the pre-entry meeting and with others working near the space before entering the space.

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6 General Requirements:

- 6.1 Each confined space being entered shall have a minimum of one dedicated attendant and one other support person (who may have other duties) within sight or call.
- 6.2 All Entry Supervisors must be thoroughly familiar with the confined space entry procedures and shall be responsible for ensuring that all entries are conducted according to this procedure.
- 6.3 The use of the space, internal configuration, size of the openings, contents, constructions materials, internal mechanical devices, unique characteristics and hazards are all factors that should be known by all entrants before entering.
- 6.4 No confined space entry is permitted without a properly executed Confined Space Entry Permit.
- 6.5 No confined space will be entered until it has been thoroughly tested for hazardous conditions and all of those conditions have been properly eliminated or overcome.
- 6.6 Unauthorized entry shall be prevented through measures such as training, posting of signs and barriers.
- 6.7 All required PPE must be sanitary and in proper working condition prior to use.
- 6.8 All members of the entry team must be properly trained, including the entry supervisor, entrants, attendants and rescue personnel.
- 6.9 Contingencies/Emergencies specific to each entry must be anticipated and planned for such as:
 - 6.9.1 Worker asphyxiation, engulfment or injury.
 - 6.9.2 Fire and explosion.
 - 6.9.3 Fluid or gas leaks.
- 6.10 All support equipment such as breathing apparatus, fire extinguishers, rescue ropes and harnesses, atmospheric monitors and required electrical devices (Ground Fault Circuit Interrupters [GFCI], explosion proof or intrinsically safe equipment, etc.) shall be utilized during entry and readily available as needed.

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- 6.11 Rescue procedures and related equipment must be anticipated beforehand and be readily available during entry.
- 6.12 Any deviation from this procedure must be approved in writing and attached to the Entry Permit by the Supervisor responsible for Confined Space Entry.

7 Confined Space Isolation Procedure:

- 7.1 Before persons are permitted to enter a confined space the following isolation procedures shall be conducted where applicable:
 - 7.1.1 Depressurize the confined space if necessary.
 - 7.1.2 The confined space must be isolated by Lockout/Tagout to preclude the entry of hazardous materials. Prevent the introduction into the confined space of hazardous materials from interconnecting equipment such as piping, ducts, vents, drains or other means. This will include not only inlet and outlet piping but all potential sources (electrical, thermal, hydraulic, mechanical, pneumatic, etc.).
- 7.2 Lockout/Tagout any hazardous energy sources within or attached to the confined space to prevent accidental movement or energizing of such sources. Where applicable, one or more of the following methods shall be used:
 - 7.2.1 Remove a valve, spool piece, or expansion joint in piping to, and as close as possible to the confined space, and blank or blind a pipe or duct at the nearest accessible point to the confined space.
 - 7.2.2 Employ the "double block and bleed" technique (a method used to isolate a confined space from line, duct or pipe by locking closed and tagging in-line valves on a piping system, and opening a valve between them that is vented to the atmosphere) at the nearest accessible point to the space.
 - 7.2.3 In cases where lines have contained hazardous liquids or gases, inert gases, or gases or liquids at high temperature or pressure, all lines entering the space (process, steam, pneumatic or hydraulic lines, vents, drains, etc.) shall be physically disconnected as close to the tank or vessel as possible and practical.
 - 7.2.4 Lines shall also be physically disconnected if they could introduce non-hazardous substances into the space in quantities that could engulf the entrants. If possible the open ends of disconnected

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lines must be blanked or capped to prevent any liquids or gases from entering the space. All blind flanges must be of sufficient thickness and tensile strength to withstand maximum pressures and corrosion by chemicals to which they may be exposed.

- 7.2.5 Pressure in the lines must be bled down to atmospheric levels. Where lines cannot be physically disconnected due to space limitations, they may be blinded and tagged or a double block and bleed arrangement may be used.
- 7.3 To avoid the buildup of static electricity, all lines and other equipment used during the entry shall be electrically bonded and grounded to the space.
- 7.4 All sources of ignition within the space, and those nearby which are close enough to pose a hazardous, shall be turned off and locked out.

8 Ventilation:

- 8.1 Continuous ventilation of the space shall be performed under the following cases:
 - 8.1.1 Initial air monitoring was not acceptable.
 - 8.1.2 Natural ventilation is not adequate (example, space has only one entrance).
 - 8.1.3 Chemicals are to be introduced into the space for cleaning or other purposes.
 - 8.1.4 Welding or other "hot work" is to be conducted inside the space.
- 8.2 Only intrinsically safe air movers shall be used to ventilate confined spaces. Such air movers must be electrically bonded and grounded to prevent any buildup of static charge during operation.
- 8.3 Oxygen or power air-driven ventilators shall not be used to ventilate space.
- 8.4 Air movers used for ventilation shall be operated in the supply mode. The ventilation rate shall be high enough to achieve 20 air changes per hour.
- 8.5 Blowers shall be placed within 5 feet of the entry to the space to prevent re-entry of contaminated air.

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- 8.6 Whenever possible, air movers shall be used with ducting to increase the efficiency of ventilation in the space and to prevent re-entry of contaminated air. For maximum efficiency, the end of the ducting must be placed within 2 feet from the bottom of the space.
- 8.7 If the ventilation stops, all entrants shall evacuate the space immediately.
- 8.8 The space must be thoroughly ventilated using atmospheric air only (never compressed air or oxygen). The equipment providing the ventilation outside the confined space must be situated to ensure that it does not introduce exhaust fumes or other toxic gases into the space.
- 8.9 Continuous ventilation shall be used while welding in a confined space or working in tank/vessel(s) that contain sludge, scale or other flammable materials

9 Potential Hazards Of Confined Space Entry:

- 9.1 Asphyxiation may occur because:
 - 9.1.1 Certain chemicals can absorb or replace oxygen in the space (inert gases).
 - 9.1.2 Welding processes can deplete oxygen in the confined space and elevate the carbon monoxide levels.
 - 9.1.3 Metal oxidation (rusting) inside a closed vessel may deplete oxygen from the atmosphere.
 - 9.1.4 Improper or inadequate ventilation can allow toxic or asphyxiation gases to accumulate within the space.
- 9.2 Gases or dusts present a fire and/or explosion hazard and:
 - 9.2.1 May come from residues in the confined space.
 - 9.2.2 May enter from upstream or downstream components.
 - 9.2.3 May be introduced by compressed welding gases (acetylene, oxygen, etc.).
 - 9.2.4 May be introduced by liquid or gaseous releases from outside the confined space.
- 9.3 Toxic substances or atmospheres:

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- 9.3.1 May be introduced from inside or outside the space.
- 9.3.2 May cause damage through inhalation, ingestion or direct skin contact.
- 9.3.3 Exposure effects may vary from mild to fatal.
- 9.3.4 May be generated from procedures or materials used during the entry.
- 9.4 Electric shock can occur if electrical energy to the space is not properly disconnected and locked out or tagged out, or if equipment used in the space is improperly grounded or insulated.
- 9.5 Physical injuries can occur because of:
 - 9.5.1 Slippery conditions within the space.
 - 9.5.2 Falling objects.
 - 9.5.3 Contact with hot metal or corrosive chemicals.
 - 9.5.4 Failure to disconnect and lock out all energy supplies to moving equipment inside the confined space.
 - 9.5.5 Poor lighting.
 - 9.5.6 Cave-in when working in a trench or excavation.
- 9.6 **Note** existing or potential hazards such as:
 - 9.6.1 Oxygen deficiency or enrichment.
 - 9.6.2 Flammability.
 - 9.6.3 Toxicity.
 - 9.6.4 Mechanical hazards.
 - 9.6.5 Heat hazards.
 - 9.6.6 Engulfment.

10 Confined Space Atmospheric Monitoring Procedures:

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- 10.1 A written record of the pre-entry atmospheric monitoring results shall be documented and kept at the work site for the duration of the entry. This record is part of the entry permit and is to be kept on file for 1 year.
- 10.2 The entry supervisor shall certify in writing, based upon the results of the pre-entry atmospheric monitoring, that all hazards have been eliminated.
- 10.3 All affected persons must be able to review the test results.
- 10.4 The most hazardous conditions will govern when work is being performed in two adjoining, connecting spaces.
- 10.5 After the space has been removed from service and prior to entry, a trained entrant or attendant shall conduct initial testing of the atmosphere inside the space. The testing shall be performed in the following sequence:
 - 10.5.1 Oxygen.
 - 10.5.2 Flammable atmosphere (%LFL), and
 - 10.5.3 Toxic gases or vapors. Record the readings on the entry permit.
- 10.6 Atmospheric testing shall be conducted using only properly calibrated air monitoring equipment. Properly calibrated equipment is equipment that has been calibrated using the manufacturer's recommended specifications within the past 90 days. The most recent calibration date shall be marked on the equipment and in the log book for testing and maintenance of such equipment.
- 10.7 After appropriate ventilation, a check of the atmosphere inside the confined space shall be conducted prior to entry, as determined by the potential hazard and immediately prior to any hot work. If IDLH conditions are suspected, an air supplied respirator must be used while conducting initial testing. Record the readings.
- 10.8 Ventilating equipment shall be turned off at least fifteen minutes prior to performing any atmospheric monitoring to ensure that the values shown are representative of the raw atmosphere within the space.
- 10.9 Tests shall be conducted with a properly calibrated detector(s) in the following order:
 - 10.9.1 Oxygen.

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10.9.2 Flammable vapors (%LEL).

10.9.3 Suspected airborne contaminants.

10.10 The person conducting the atmospheric monitoring shall initial and list on the permit the date/time the testing was conducted and the results of the test.

10.11 Atmospheric monitoring shall be conducted at a minimum of 3 locations within the space (i.e., bottom, middle, and top of space) for a minimum of 1 minute in each location. Record the readings on the entry permit.

10.12 If entry is to be through a manhole, initial air monitoring shall be conducted through the manhole cover without removing the cover whenever possible. This is to prevent sparking in case of a flammable atmosphere in the space.

10.13 If entry is to be through the side of a space, testing immediately inside the space shall be conducted prior to entry. After entry, atmospheric monitoring of the space 5 feet in front of the entrant shall be conducted using a 3 foot probe.

10.14 All atmospheric monitoring results shall be legibly recorded on the entry permit documenting the range of results obtained from the different sampling locations within the space.

10.15 Entry into a confined space is prohibited when one or more of the following conditions are present:

10.15.1 Atmospheric oxygen concentration below 19.5 or above 23.0 percent.

10.15.2 Flammable atmosphere in excess of 10 percent of its LEL.

10.15.3 Airborne combustible dust at a concentration that obscures vision at a distance of 5 feet or less, or combustible dust concentration is more than LEL.

10.15.4 Any air contaminant at a concentration in excess of its allowable concentration.

10.15.5 If the oxygen concentration is not within the range of 19.5 to 23.0 percent, the reason for the abnormal reading shall be investigated. Such a reading may indicate the presence of

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another toxin, such as carbon monoxide, that displaces oxygen. This toxin shall also be monitored for.

10.15.6 If any or more of the above conditions exist, the space shall be ventilated for a minimum of 10 minutes prior to re-testing.

- a. With the ventilation still on, retest the space.
- b. If conditions are still not acceptable, contact a qualified professional.

10.16 All atmospheric monitoring shall be performed by a trained qualified person, such as an entry supervisor, Health & Safety professional, etc., and all readings are to be recorded on the Confined Space Entry Permit.

10.17 Continuous atmospheric monitoring may be needed based upon the potential for changing atmospheric conditions. Readings are to be recorded every fifteen minutes.

11 Confined Space Entry Permit:

11.1 The entry permit serves several essential functions:

11.1.1 It restricts entry so that only authorized personnel may enter a confined space.

11.1.2 It ensures that communication takes place and hazards are controlled.

11.1.3 It minimizes safety precautions to be taken.

11.1.4 Serves as an official written record of existing conditions, requirements and safeguards.

11.1.5 Serves as a tool for reviewing this procedure.

11.2 Entry into a confined space shall be documented in writing using an ENTRY PERMIT.

11.2.1 The permit is a written authorization and approval that specify the job to be done and certify that all hazards have been evaluated and protected against.

11.2.2 It also serves as a record of all entrants.

11.2.3 All required signatures must be present and the permit must be filled out completely.

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- 11.3 Entry permits are only valid for a specified time period (e.g., one task or one shift).
- 11.4 Prior to entry, a copy of the entry permit shall be made available to all entrants by posting it at the portal. All entrants shall examine it to determine if entry conditions have been met.
- 11.5 The original permit and any subsequent permits shall be retained for a minimum of one year.
- 11.6 All permit required confined space entries shall have the following minimum equipment at the entry site prior to initiating the entry:
 - 11.6.1 Communication equipment.
 - 11.6.2 Full body harness.
 - 11.6.3 Appropriate PPE.
 - 11.6.4 For top entry: rescue line & tripod retrieval winch.
 - 11.6.5 For bottom entry: rescue line, wristlets.
- 11.7 A separate Hot Work Permit shall be obtained for any welding, burning, drilling or other hot work that will take place within the space and attached to the entry permit.
- 11.8 The Entry Permit shall outline the elements of a rescue plan for the rescue of entrants in case of an emergency. It will outline at least the following elements:
 - 11.8.1 Designated rescuers.
 - 11.8.2 Equipment.
 - 11.8.3 Methods of summoning the rescue team.
- 11.9 Prior to any confined space entry, a pre-entry safety meeting shall be held that involves all participants and covers at least the following points:
 - 11.9.1 Review all existing or potential hazards that may exist in the space.

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11.9.2 Review the required levels of PPE. The entry supervisor shall ensure that each participant has the proper PPE and knows how to use it.

11.9.3 Discuss the work to be performed, who will do it and how it will be done safely.

11.9.4 Review the rescue plan that will be activated in case of emergency.

11.9.5 Anyone not attending the pre-entry safety meeting will not be allowed to enter the permit space until they have been briefed on all the information presented at that meeting.

11.10 Preparation of the Entry Permit:

11.10.1 Entry into a permit-required confined space shall not be made unless an entry supervisor has assured that the following procedures have first been completed:

11.10.2 Obtain a blank Entry Permit and fill it out. The permit will indicate:

- a. The specific confined space to be entered.
- b. What work is to be performed.
- c. The length of time estimated to complete the work. Permits are only valid for 12 hours. A permit may be extended for another 12 hours provided that acceptable conditions are re-certified and the test results entered on the permit.
- d. What date and time the work will be started.
- e. What personnel, names and titles, will perform the work.
- f. Name and title of authorizing authority.
- g. Name and title of Entry Supervisor.
- h. Name and title of person acting as the "Attendant".
- i. All pumps or lines which may convey flammable, injurious, or incapacitating substances into the confined space shall be disconnected, blinded, (double blocked or bled), or effectively isolated by other means to prevent the development of dangerous levels of air contamination or oxygen deficiency within the space. The closing of valves alone, or the closing of valves and locking or tagging of them, is not considered effective protection. The disconnection or blind shall be so located or done in such a manner that inadvertent reconnection of the line or removal of the blind are

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- effectively prevented.
- j. **NOTE: This does not require the blocking of all laterals to sewers or storm drains unless experience or knowledge of industrial use indicates materials resulting in dangerous air contamination may be dumped into an occupied sewer.**
 - k. The atmospheric testing equipment must be “field checked” prior to testing the atmosphere in the confined space.
 - l. Atmospheric testing must be conducted for oxygen levels between 19.5% and 23.0% by volume and the percentage found is to be entered on the permit. The last calibration date of the oxygen detector must be entered on the permit.
 - m. Atmospheric testing must be conducted for flammable gas, vapors or mists in excess of 10% of its LEL and results noted on the permit. The last calibration date of the combustible gas indicator must be entered on the permit.
 - n. The confined space must be flushed or emptied of all dangerous substances and then tested for known toxic substances for the Permissible Exposure Limit (PEL) per Attachment A.
 - 1. Enter the value of the PEL on the permit.
 - 2. If a hazardous atmosphere is present ventilation and respirators must be provided.
 - O. Electrical and mechanical hazards must be removed or prevented from causing a hazardous situation.
 - 1. Employees entering a permit-required confined space with a hazardous atmosphere must be provided with an appropriate retrieval device, retrieval line and an appropriate respirator. The associate must have received and have documented training on the use of a respirator. If a hazardous atmosphere is present atmosphere testing shall be conducted every hour that the confined space is occupied and results noted on the permit.

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- p. If there is a problem, necessary action shall be taken to ensure the safety of those involved. The attendant is to contact the applicable rescue team and inform them of the conditions when they arrive on the scene.
- q. **NOTE: Under NO circumstances is the attendant to enter the confined space.**
- r. When the work has been completed the Entry Supervisor shall sign the permit as being completed and all conditions in the confined space have been returned to normal, the space is closed and properly marked.

12 Confined Space Illumination:

- 12.1 All confined spaces shall be properly illuminated.
- 12.2 When temporary lighting is used in confined spaces containing combustible or flammable dusts, residues or contaminants, the following requirements shall be met:
 - 12.2.1 All temporary lighting and powered equipment shall be protected by the use of a Ground Fault Circuit Interrupter (GFCI) or be the low voltage type (12 volts).
 - 12.2.2 All lighting shall be Factory Mutual (FM) or Underwriters Laboratories (UL) approved. Equipment used in hazardous areas shall match the classification of the area (i.e., Class 1 or 2, Division 1 or 2, etc.).
 - 12.2.3 Extension cords used for temporary lighting shall be equipped with connectors or switches approved for hazardous locations.

13 Protective Equipment:

- 13.1 Appropriate protective equipment (selection based on exposure) shall be worn during entry. This may include but is not limited to the following:
 - 13.1.1 Protective clothing.
 - 13.1.2 Hard hat.
 - 13.1.3 Gloves.
 - 13.1.4 Suitable work boots.
 - 13.1.5 Safety glasses with side shields, or face shields.
 - 13.1.6 Respiratory protection.

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- 13.2 No one will use respiratory protection unless they have been properly trained and qualified in its use according to 1910.134.
- 13.3 A rescue line shall be worn by all entrants unless it would increase the overall risk of entry.
- 13.3.1 The rescue line shall be attached to a mechanical device or fixed point outside the space. **Under NO circumstances is the line to be fastened to a vehicle.**
- 13.3.2 A mechanical device must be available to retrieve personnel from vertical type spaces more than 5' deep.
- 13.3.3 A full body harness shall be worn for all top entry confined spaces.
- 13.4 Personal Protective Equipment (PPE) is necessary for entry into a confined space if the space contains a corrosive hazard or if chemicals brought into the space requires such clothing.
- 13.4.1 The proper type of PPE must be assigned for use in confined spaces based on the types and amounts of hazardous substances present in the confined space.
- 13.4.2 The Entry Supervisor is to contact the Site Safety Coordinator if there is any question about what is the proper PPE for a particular entry.
- 13.4.3 Additional information may be obtained from the applicable MSDS.
- 13.5 Where required, PPE shall be used in accordance with 1910.134, and shall be NIOSH approved.
- 13.5.1 Respiratory protection is required in situations where hazardous dusts are present and when atmospheric monitoring results dictate.
- 13.5.2 The Site Safety Coordinator shall determine the proper type of respiratory equipment required.
- 13.5.3 Employees must be trained in the proper selection and use of PPE.
- 13.6 Retrieval equipment is required for all permit required confined spaces such as entries that:

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13.6.1 Present an engulfment hazard from the presence of a material inside the space during entry.

13.6.2 Involve hot work or the presence of chemicals inside the space.

13.6.3 Require the use of air supplying respirators.

13.7 Retrieval equipment shall include:

13.7.1 A retrieval line that shall be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device shall be available to retrieve associates from vertical type permit spaces more than 5' feet deep.

13.7.2 A chest or full body harness, with a retrieval line attached at the center of the entrants back near shoulder level, or above the entrants head. Wristlets may be used in place of the chest or full body harness if the Entry Supervisor can demonstrate that the use of a chest or full body harness is infeasible or creates a greater hazard and that the use of wristlets is the safest and most effective alternative.

13.7.3 Fall protection for spaces greater than 6' feet in depth and requiring entry through the top.

13.8 As a minimum, safety glasses and safety shoes or boots shall be worn while in a confined space.

14 Miscellaneous Tools and Equipment:

14.1 Many types of tools and equipment may be utilized to conduct a confined space entry. The tools and equipment shall meet the following minimum criteria:

14.1.1 Electrical tools using nominal 120 volt alternating current shall be grounded and connected only to a GFCI circuit. (Low voltage systems (12 volts) are preferred.)

14.1.1 Within spaces where a flammable atmosphere may exist, all electrical equipment shall be explosion proof or intrinsically safe.

14.1.2 All electrical lighting systems shall be connected to a GFCI circuit or provided by a 12 volt electrical system.

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14.1.3 Where ladder or scaffolding use is required, all equipment shall be non-slip/skid and shall be secured (tied off) as necessary to ensure against falling.

14.1.4 Arc welding equipment shall be properly grounded, taken into space only when needed and removed as soon as possible. A Hot Work Permit is required.

14.1.5 Compressed gas cylinders (except breathing air and portable fire extinguishers) **ARE NOT** to be taken into any confined space. Oxyacetylene hoses and arc welding equipment may be taken into the space but must be checked for leaks and/or cracks prior to use. If leaks or cracks are found the hose or cable shall be replaced immediately.

15 Medical Considerations:

15.1 Individuals who are claustrophobic should be made aware of the conditions involved in a confined space and should notify their supervisor if they feel unable to function in such an environment. The Supervisor should excuse such individuals.

16 Other Precautions:

16.1 The number of confined space entrants should always be kept to a minimum, especially during "hot work" (welding or burning).

16.2 Entry will not be permitted until entrants have a minimum visual distance of 5 feet within the confined space.

17 Additional Procedures:

17.1 Rescue Service Personnel:

17.1.1 Rescue teams shall be from the local fire department.

17.1.2 All rescuers entering the space shall be trained and equipped to perform rescues. They shall also be trained as entrants.

17.1.3 A rescue entry is to be considered as IDHL until proven otherwise.

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17.1.4 Rescuers shall use a separate air supply from those being rescued.

17.1.5 Rescue teams shall:

- a. Be provided with (at no cost) and trained to use properly, all necessary equipment to make rescue from a confined space.
- b. Practice making confined space rescues at least once every twelve months, extracting dummies, mannequins or personnel from confined space that closely approximate those for whom rescue may be required.
- c. Have each member of the rescue service trained in basic first-aid and CPR. At least one of the rescuers holding current certification in CPR and basic first-aid shall be available.
- d. Reserve teams shall be on site during any IDLH entry.
- e. Rescue teams shall be given an opportunity to examine the entry site, practice rescue, and decline as appropriate.

17.2 Emergency Preparation and Procedures:

17.2.1 Appropriate fire protection and/or water supply should be readily available and operable if needed.

17.1.2 For emergencies:

- a. At least one reserve air line cart and two air lines must be readily available.
- b. A rescue harness and line(s) must be available.
- c. If necessary, a SCBA may be used in lieu of an airline respirator when used in conjunction with a five-minute escape bottle.

17.1.3 Attendants will not enter a confined space to make a rescue unless ALL the following conditions are met:

- a. They are relieved by another attendant.
- b. They are also trained as entrants.
- c. They are equipped with the proper PPE clothing and equipment.

18 Training:

18.1 Managers and Supervisors shall inform their employees of the hazards of working in confined spaces and permit-required confined spaces by providing specific training to employees before they may be authorized to enter a confined space.

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- 18.2 For those working in confined spaces, training shall be conducted in the following manner. At the time of hire and annually for all current employees. Training shall be documented. All training records shall be maintained for a period of not less than 3 years.
- 18.3 New employees shall receive an introduction to confined space entry procedures from the Site Safety Coordinator. It will include a briefing on and a copy of, the confined space entry procedure Supervisors must ensure that untrained employees **DO NOT** participate in confined space entries.
- 18.4 All entry supervisors, entrants and attendants shall attend an annual training course to keep aware of changing requirements and to maintain skills. Supervisors shall document through the Site Safety Coordinator that the required training has been received and that the employee is proficient in the duties required of him/her. Documentation shall contain each trained associate's name, the signature of the trainer and the date of training.
- 18.5 Training shall include but is not limited to the following:
- 18.5.1 All entry supervisors, entrants and attendants of a confined space shall have completed training on the related Facilities Management Policies and Procedures that meet applicable VOSH regulations, including 1910.146 (Permit Required Confined Space), 1910.134 Respiratory Protection), 1910.1200 (Hazard Communication) and 1910.147 (Hazardous Energy Control [Lockout/Tagout]).
 - 18.5.2 Use of atmospheric testing devices, for those employees required to perform atmospheric tests, including field checks as specified by the manufacturer, normal use and specific limitations of the equipment.
 - 18.5.3 Use of special equipment and tools, including rescue equipment.
 - 18.5.4 Emergency and rescue methods and procedures.
 - 18.5.5 Duties of the "entry supervisor" during permit-required confined space operations.
 - 18.5.6 Duties of the "attendant" during permit required confined spaces.
 - 18.5.7 Duties of the "entrant" during permit required confined spaces.

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- 18.5.8 The entry permit system.
- 18.5.9 A "hands on" practice session.
- 18.6 Training shall be given to affected employees at the following times:
 - 18.6.1 Before the employee is first assigned duties relating to confined space.
 - 18.6.2 Before there is a change in his/her assigned duties related to confined space.
 - 18.6.3 Whenever there is a change in permit space operations that presents a hazard about which the associate has not been trained.
 - 18.6.4 Whenever the supervisor has reason to believe that the employee's knowledge or use of procedures are inadequate or there have been deviations from those procedures.
 - 18.6.5 A written test will be required to be completed by all trainees. The test shall be written by the trainer and is to be sufficient in nature to determine that the trainee has learned the necessary safety requirements of a confined space entry.
 - 18.6.6 Failure to pass the written test with a score of at least 70% correct shall result in re-training.
- 18.7 Rescue Teams shall be trained to use the equipment they may need to perform rescue functions.
 - 18.7.1 Rescue teams, including those from emergency community service organizations, shall practice annually removing victims from representative confined spaces of the same configurations and accessibility from which an actual rescue could be required.
 - 18.7.2 The attendant and/or at least one member of each rescue team shall hold a current certification in basic first aid and CPR (Cardio-Pulmonary Resuscitation).
- 18.8 Training records shall be kept on file by the Safety Manager and shall include the following information:
 - 18.8.1 Date of the training program.
 - 18.8.2 The instructor(s) name and title.

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18.8.3 Names of employees and titles.

18.8.4 Outline of topics covered.

18.8.5 Copies of tests and test scores.

19 Contractors and Sub-Contractors:

19.1 Sub Contractors shall be informed by the Project Manager of the hazards of the confined space prior to the beginning of work. The Project Manager shall provide the sub contractor with an evaluation of the confined space(s) involved, Confined Space Entry procedure, MSDS's for any chemicals in the area of the job and the Lockout/Tagout Procedure. The Project Manager shall also audit the sub contractor to verify proper work practices.

19.2 (Reference CFR 1910.146 (C)(8): When an employer (host employer) arranges to have employees of another employer (contractor) perform work that involves permit space entry, the host employer shall:(i) Inform the contractor that the workplace contains permit spaces and that permit space entry is allowed only through compliance with an permit space program meeting the requirements of this section; (ii) Appraise the contractor of the elements, including the hazards identified and the host employer's experience with the space, that make the space in question a permit space; (iii) Apprise the contractor of any precautions or procedures that the host employer has implemented for the protection of employees in or near permit spaces where contractor personnel will be working.(iv) Coordinate entry operations with the contractor, when both host employer personnel and contractor personnel will be working in or near permit spaces, as required by paragraph (d)(11) of this section; and(v) Debrief the contractor at the conclusion of the entry operations regarding the permit space program followed and regarding any hazards confronted or created in permit spaces during entry operations.

19.3 Sub Contractors who will enter confined spaces must be pre-qualified to perform such work by providing the following documentation to the Project Manager:

19.3.1 Their general safety policies and procedures.

19.3.2 Their Confined Space Entry Procedure (It must meet the requirements of CAL/OSHA 1910.146.)

19.3.3 Their Entry Permit Program and Permit.

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- 19.3.4 Training certification for all involved personnel. At least one contractor employee on the job site must be certified as an Entry Supervisor.
- 19.3.5 Their Hot Work procedures and permit if the job involves hot work.
- 19.3.6 Names of past customers where they have done work involving confined spaces.
- 19.3.7 List of confined space safety equipment they will provide for use on the job.
- 19.3.8 Emergency procedures they will use on the job.
- 19.3.9 A statement indicating that they have never been cited by state or federal safety compliance agencies for any confined space safety infraction. If they have been cited previously, a copy of the citation and a statement from them describing the corrective action they have instituted shall be provided.
- 19.3.10 Reference 1910.146 (C) (9): In addition to complying with the permit space requirements that apply to all employers, each contractor who is retained to perform permit space entry operations shall: Obtain any available information regarding permit space hazards and entry operations from the host employer; Coordinate entry operations with the host employer, when both host employer personnel and contractor personnel will be working in or near permit spaces, as required by paragraph (d)(11) of this section; and Inform the host employer of the permit space program that the contractor will follow and of any hazards confronted or created in permit spaces, either through a debriefing or during the entry operation.
- 19.4 Contractor personnel shall conduct atmospheric monitoring using their own calibrated equipment and must issue an entry permit using their own form. Documentation of proper calibration shall be available at the work site.
- 19.5 Contractors shall be responsible for the assignment of appropriate PPE for their personnel.
- 19.6 Contractors shall have their own appropriate rescue equipment, rescue team and procedures available at the work site.

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19.7 Upon completion of the contractor's confined space work, a copy of the contractor's Entry Permit shall be forwarded to the Project Manager to be filed and retained for annual review.

19.8 The Contractor shall provide a signed statement indicating that they assume primary responsibility for compliance with local, state, and federal regulations concerning employee safety and health and environmental issues.

19.9 The Contractor shall provide a signed statement to the Project Manager that they have received and understand the items mentioned above that must be provided to the contractor.

19.10 The Project Manager will meet with the Contractor to review safety issues that were involved on the job after completion of work by the Contractor

20 Discipline:

20.1 Failure to follow the requirements of this procedure by any employee may result in disciplinary action according to Therma's discipline policy up to and including termination.

21 Review:

21.1 This procedure will be reviewed:

21.1.1 Whenever any deficiencies are found, this procedure shall be revised to correct those deficiencies before any subsequent entries are authorized.

21.1.2 This procedure shall be reviewed and revised as necessary at least every 12 months using the canceled/completed permits from entries performed during that period.

<p style="text-align: center;">Safety Manual</p> <p style="text-align: center;">Mobile Crane Safety Policy</p>

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Revision No.: 3

Effective: 06-99
Revision Date: 01-11
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Mobile Crane Safety Policy

1. Purpose and Scope:

- 1.1 The purpose of this policy is to ensure the protection of Therma employees, the general public and public/private property during mobile crane operations.
- 1.2 Therma shall insure that all crane operations are conducted in accordance with 29 CFR 1926.550.
- 1.3 This policy applies to all mobile crane operation under the direction of Therma.
- 1.4 For rigging policy and procedures, reference Therma's Rigging and Material Handling Procedure.

2. Responsibility:

- 2.1 It is the responsibility of all supervisors to ensure crane operations are conducted in accordance with this policy.
- 2.2 It is the responsibility of the supervisors to ensure subcontractors follow the provisions of this policy.
- 2.3 It is the responsibility of the supervisor to notify the safety department prior to commencing crane operations.
- 2.4 It is the responsibility of all employees involved in mobile crane operations to follow the requirements of this policy.
- 2.5 It is the responsibility of the safety department to provide guidance and assistance to the supervisors during mobile crane operations.

3. Policy:

- 3.1 Certified crane operators who meet the qualifications described in ANSI B30.5 5-3.1.2 and/or certified under the National Commission for Certified Crane Operators (NCCCO) guidelines shall only operate cranes.

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- 3.2 Crane operator must provide evidence of qualification prior to commencing crane operations.
- 3.3 Crane shall have a current annual inspection and certified as safe by an independent 3rd party.
- 3.4 Evidence of annual inspection shall be provided prior to commencing crane operations.
- 3.5 Evidence of crane company insurance shall be provided prior to commencing crane operations.
- 3.6 Crane operations manuals and load charts specific to each crane shall be onsite and accessible.
- 3.7 A competent person shall inspect cranes prior to each use to ensure they are in safe operating condition. Evidence of inspection shall be onsite and accessible.
- 3.8 The crane and swing radius of the boom shall be barricaded with red danger barricade tape.
- 3.9 Entry into the crane operating zone shall be restricted to the crane operator and riggers.
- 3.10 Accessible areas within the swing radius of the rear of the rotating crane superstructure shall be barricaded in such a manner as to prevent an employee from being struck or crushed by the crane.
- 3.11 All personnel involved in that day's crane operation shall conduct a pre-lift safety meeting.
- 3.12 Crane Safety Checklist shall be completed and maintained on site by the supervisor prior to commencing crane operations.
- 3.13 Cranes shall only perform vertical lifts. Attempting to pull objects in any direction other than vertical may result in crane failure.
- 3.14 The crane operator shall maintain minimum clearances from overhead power lines.

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Voltage (KV)	Required Clearance
0 - 50 KV	10 feet
50 - 100 KV	15 feet
200 - 350 KV	20 feet
350 - 500 KV	25 feet
500 - 750 KV	35 feet
750 - 1,000 KV	45 feet

- 3.15 All personnel in the vicinity of the crane shall make eye contact with the operator prior to passing through or near the crane operations so as to make the operator aware of their presence.
- 3.16 Only one person shall signal the crane operator. The designated / qualified person shall be familiar with the crane's operation and shall be able to communicate with the crane operator with appropriate hand signals.
- 3.17 Any member of the crane lift team has the authority to stop the crane operator when there is a hazardous condition.
- 3.18 No personnel shall be permitted on or under suspended loads at any time.
- 3.19 Crane operator shall sound an alarm or horn blast when the load is about to be lifted.
- 3.20 Always evaluate weather conditions prior to and during crane operations. Lifting operations shall be re-evaluated whenever wind speeds exceed 25 mph, or if other environmental conditions could hinder those operations.
- 3.21 Any rigging equipment not in use shall be properly stowed as not to create a hazard for personnel working in the crane operating area.
- 3.22 Rigging of equipment must be performed by a designated / qualified person.

4. Crane Lift Plans:

- 4.1 Crane Lift Plans shall be prepared prior to any crane lift operations. The plan will be maintained on the job site during crane operations. At a minimum, the plan shall consist of the following documents:
 - Crane Safety Check List.

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- Copy of the crane operator certification card
- Evidence of Qualified Rigger and Signal Person
- Copy of the 3rd party annual inspection.
- Copy of evidence of insurance.
- Diagram detailing crane position and swing radius.

5. Pre-lift Safety Meeting:

- 5.1 The supervisor shall conduct a pre-lift safety meeting prior to commencing crane operations.
- 5.2 All employees, including crane company personnel, involved in the crane operation shall attend the pre-lift safety meeting.
- 5.3 The time, date and all personnel attending the meeting shall be documented on the Crane Safety Checklist.
- 5.4 At a minimum, the following items shall be determined and discussed with all employees involved in crane operations:
 - General work scope of the lift operation.
 - Method to control unauthorized personnel from entering the work zone.
 - Communication and signaling.
 - Rigging responsibilities and inspection.
 - Evacuation plan.
 - Roles, responsibility and location of each team member.
 - Tag line usage.
 - Hazards: pinch points, crush zones, etc.
 - Personal Protective Equipment.
 - Weather conditions. Overhead obstructions (power lines, trees, etc).

<p>Safety Manual</p> <p>Rigging – Material Handling</p>

DCR No.:58
Revision No.: 2

Effective: 01/09
Revision Date: 08-15
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Rigging – Material Handling

1 Purpose and Scope:

- 1.1 Therma shall insure that all rigging and material handling equipment are properly safe and used in accordance with the manufacturer's guidelines and compliant with OSHA standard 1926.251 and 1910.184.
- 1.2 The use of any rigging / material handling equipment not in compliant with any portion of this policy is prohibited.
- 1.3 Rigging materials and equipment for overhead crane lift operations shall be performed by a designated / qualified rigger.

2 Responsibility:

- 2.1 It is the responsibility of all supervisors to ensure employees involved in rigging / material handling are trained and are in compliant with the requirements of this policy.
- 2.2 It is the responsibility of all employees involved in rigging / material handling to follow the requirements of this policy.

3 Policy:

3.1 Inspections:

- 3.1.1 Initial inspections, before any new equipment is placed into service shall be inspected by a designated / qualified person
- 3.1.2 Rigging equipment shall be inspected by a qualified person prior to each use on each shift and as necessary during its use to ensure it is safe.
- 3.1.3 Defective or damaged rigging equipment, including slings and hooks, shall be removed from service immediately.
- 3.1.4 Rigging equipment shall be marked with the rated load. Without such marking, the equipment shall be removed from service.

3.2 Use-General:

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- 3.2.1 Slings shall not be shortened with knots, bolts, or other makeshift devices.
- 3.2.2 Slings, chains or similar devices shall not be shock loaded or loaded in excess of their rated capacities.
- 3.2.3 Slings shall be set to avoid slippage.
- 3.2.4 Slings used in a basket hitch shall have the loads balanced to prevent slippage.
- 3.2.5 Slings shall be padded or protected from the sharp edges of their loads.
- 3.2.6 Rigging equipment not in use shall be removed from the immediate work area so as not to present a hazard to employees.
- 3.2.7 Tag lines shall be used when lifting loads unless such use creates an unsafe condition.
- 3.2.8 Suspended loads shall be kept clear of all obstructions.
- 3.2.9 Under no conditions shall an employee be allowed under a suspended load.
- 3.2.10 Hooks on ball assemblies, lower load blocks, or other attachments shall be of a type that can be closed and locked, eliminating the "hook throat opening".
- 3.2.11 Hands or fingers shall not be placed between the sling and its load while the sling is being tightened around the load.
- 3.2.12 A sling shall not be pulled from under a load when the load is resting on the sling and damage to the sling may result.

4. Synthetic Slings:

- 4.1 Synthetic Slings must be taken out of service if any of the following effects are noted.
 - 4.1.1 Missing or illegible sling identification.
 - 4.1.2 Acid / caustic burns.
 - 4.1.3 Evidence of melting / charring.
 - 4.1.4 Cuts / tears that expose core yarns.
 - 4.1.5 Stretch or elongation exceeding the amount recommended by manufacturers.
 - 4.1.6 Knots in any part.

5. Chain Sling:

- 5.1 Chain slings must be removed from service if any of the following defects are noted.
 - 5.1.1 Links / Rings / Hooks – nicks, cracks, gouges, excessive wear, bent links, stretched links, heat damage, rust or corrosion.

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- 5.1.2 Uneven lengths when sling legs are hanging free.
- 5.1.3 Individual link must hinge freely with adjoining link.
- 5.14 Deformed master links or coupling links.

- 5.2 Chain slings must be made from grade 80 and 100 alloy chain and tested in accordance with NACM specs 1990.
- 5.3 Annealing or normalizing shall be done only in accordance with the chain manufacturer's specifications
- 5.4 Only chains recommended for slinging or hoisting by the manufacturer, shall be used for hoisting purposes. Proof coil steel chains shall not be used.
- 5.5 Wrought iron chains in constant use shall be annealed or normalized at intervals not exceeding 6 months when recommended by the manufacturer.

6. Hooks and Shackles:

- 6.1 Hooks and shackles shall only be used in accordance with the manufacturer's recommendation
- 6.2 Hooks that do not have an identified manufacturer recommendation shall be tested at twice the intended safe working load to determine their quality before being put to use.
- 6.3 Remove from service if there is any evidence of stretching or cracks.
- 6.4 Do not attempt to straighten deformed hooks, shackles, or other attachments.
- 6.5 Deformed hooks or rings shall be replaced or repaired and reshaped under proper metallurgical control and proof tested.
- 6.6 The use of "homemade" hooks, shackles or other makeshift fasteners is prohibited.
- 6.7 Shackle pins must fit freely, without binding, and seat properly.

7. Eyebolts:

- 7.1 Eyebolts used for hoisting must be fabricated from forged carbon or alloy steel.

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- 7.2 Carbon steel eyebolts must have the manufacturer's name or identification trademark forged in raised characters on the surface of the eyebolt.
- 7.3 Alloy steel eyebolts must have the symbol "A" (denoting alloy steel) and the manufacturer's name or identification mark forged in raised characters on the surface of the eyebolt.
- 7.4 Carefully inspect each eyebolt before use.
 - 7.4.1 Visually inspect the hole to ensure that there has been no deformation.
 - 7.4.2 Check the condition of the threads in the hole to ensure that the eyebolt will secure and the shoulder can be brought down snug.
 - 7.4.3 Ensure that the shank of the eyebolt is not undercut and is smoothly radiused into the plane of the shoulder or the contour of the ring for non-shouldered eyebolts.
- 7.5 Destroy and discard eyebolts that are cracked, bent, or have damaged threads.

<h2>Safety Manual</h2> <h3>Qualified Rigger for Hoisting Activities</h3>

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Qualified Rigger for Hoisting Activities

1.0 Rigging

1.1. General

A qualified rigger is needed during assembly/disassembly of cranes (29 CFR 1926.1404), when employees are engaged in hooking, unhooking, or guiding the load, or in the initial connection of a load to a component or structure and are within the fall zone (29CFR 1926.1425). A qualified rigger is defined as a qualified person who, by possession of a recognized degree, certificate or professional standing, or who by extensive knowledge, training and experience, successfully demonstrates the ability to solve/resolve problems relating to rigging.

1.2. Rigging Person Qualification

All qualified riggers shall be evaluated by a designated person and must demonstrate their qualifications in the following areas:

- The ability to identify the load's travel path
- The ability to identify load characteristics (i.e.; determine load weight; center of gravity)
- The ability to identify correct load attachment points
- The ability to recognize special load handling requirements (i.e.; unbalanced loads
- The ability to recognize and avoid unsafe rigging practices (i.e.; pinch points; need for softeners; shock loading; side loading; unsafe body positioning; electrical hazards)
- The ability to communicate hazards to others
- The ability to perform rigging equipment inspections and identify non-conforming equipment
- The ability to identify and select appropriate slings (i.e.; chain; wire rope; synthetic rope, synthetic web; and; synthetic round)
- The ability to identify and select appropriate rigging hardware (i.e.; shackles; adjustable hardware, such as spreader bars; links, rings and swivels; rigging blocks; hooks; hoists; dollies, skates, and rollers; trolleys; beam clamps; eyebolts; swivel hoist rings; jacks)
- The ability to protect rigging equipment and load from damage by the proper use of softeners
- Demonstrate the ability to select and tie knots/hitches required for various rigging tasks
- The ability to reference Rigger's Capacity Card

3.0 Basic Crane Terminology

Auxiliary Hoist: The supplemental hoisting unit, which is usually of lower load rating and higher speed than the main hoist.

Axis of Rotation: The vertical axis around which the crane's superstructure rotates.

Boom: In cranes and derricks usage, an inclined spar, strut, or other long member supporting the hoisting tackle. Also, defined as a structural member attached to the

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revolving superstructure used for guiding and acting as a support for the load.

Boom Angle Indicator: An accessory device that measures the angle of the boom base section centerline to horizontal.

Boom Stops: A device used to limit the angle of the boom at its highest position.

Brake: A device used for retarding or stopping motion by friction or power means.

Block: Sheaves or grooved pulleys in a frame provided with hook, eye, and strap.

Crane: A machine consisting of a rotating superstructure for lifting and lowering a load and moving it horizontally on either rubber tires or crawler treads.

Counterweight: Weights used for balancing loads and the weight of the crane in providing stability for lifting.

Deck: The revolving superstructure or turntable bed.

Drum: The spool or cylindrical member around which cables are wound for raising and lowering loads.

Gantry: A structural frame work (also known as an A Frame) mounted on the revolving superstructure of the crane to which the boom supporting cables are reeved.

Headache Ball: A heavy weight attached above the hook on a single line or whip line to provide sufficient weight to lower the hook when unloaded.

Holding Brake: A brake that automatically sets to prevent motion when power is off

Jib: An extension attached to the boom point to provide added boom length for lifting specified loads.

Load: The weight of the object being lifted or lowered, including load block, ropes, slings, shackles, and any other ancillary attachment.

Load Block: The assembly of the hook or shackles, swivel, sheaves, pins, and frame suspended from the boom point.

Main Hoist: Hoist system or boom used for raising and lowering loads up to maximum rated capacity.

Mechanical Load Brake: An automatic type of friction brake used for controlling loads in the lowering direction. This device requires torque from the motor to lower a load but does not impose additional loads on the motor when lifting a load.

Outriggers: Support members attached to the crane's carrier frame which are used to the crane and may be blocked up to increase stability.

Pawl: Also known as "dog". It is a gear locking device for positively holding the gears against movement.

Pendants: Stationary cables used to support the boom.

Radius: The horizontal distance from the axis of rotation of the crane's superstructure to the center of the suspended load.

Reeving: The path that a rope takes in adapting itself to all sheaves and drums of a piece of equipment.

Running Sheave: Sheaves that rotate as the hook is raised or lowered.

Superstructure: The rotating frame, gantry and boom or other operating equipment.

Test Load: Any load or force, expressed in pounds, used for testing or certifying the limitations within acceptable tolerances of the anticipated load.

Two-Block: The condition in which the lower load lock or hook assembly comes in contact with the upper load block or boom point sheave assembly.

Quadrant of Operation: The area of operation that the lift is being made in. Usually, divided into four quadrants, i.e. front, rear and side(s) - left side and right side.

Basic Crane Types

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Telescoping Carrier Crane



Telescoping Crawler Crane



Telescoping Rough Terrain Crane



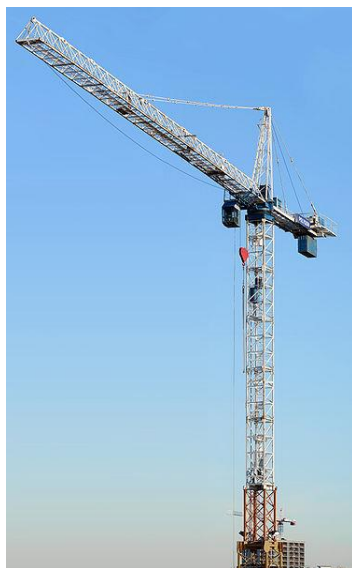
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Lattice Boom Crawler Mounted



Industrial Boom Crane



Tower Crane

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Overhead Crane



Jib Crane

4.0 Crane Safe Operating Practices & Procedures

Hoisting Procedures: Before and during hoisting operations, the person directing the lift must ensure:

- The crane is level and where necessary, blocked
- The load is secured and balanced in the sling or lifting device
- Both the lift and swing path are clear of obstructions and people
- All persons are clear of the swing radius

Avoiding Distractions:

- The operator should never be distracted while he is operating the crane. His safety and the safety of other workers depend on his constant attention on the job at hand.
- The operator must obey on signal given by the appointed signalperson with the exception of the STOP signal, which must be obeyed regardless who gives it. Hand signals must be in accordance with those specified in ASME B30.5

Leverage and Stability

- As the upper structure rotates, the crane's center of gravity moves closer to its tipping axis. The movement of the crane's center of gravity increases the load's leverage on the crane and results in the crane's capacity being lowered. This is why a rough terrain crane can become unstable, even to the point of overturning, when a load is lifted over the front and swung over the side. Be sure to consult the capacity chart before swinging to a less stable area.
- A mobile crane is stable when its leverage is greater than the load's leverage.

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- Most carrier mounted cranes have their greatest capacity over the rear. When the upper structure is rotated over the side, the capacity will be lower because the distance from the crane's center of gravity to the tipping axis is shortened. Most crane manufacturers do not allow loads to be lifted over the front unless the front stabilizer is extended and set.

Two-Blocking

- Two-blocking occurs when the hook block or headache ball makes contact with the sheaves at the main boom head, extension or jib tip. This can break the hoist rope and cause the headache ball to fall.
- Two-blocking occurs most commonly on telescoping boom cranes as a result of over hoisting or telescoping the boom without letting out the hoist line
- An anti-two-block device can stop an impending two-block condition and, if necessary, prevent further hoisting, boom extension and lowering of the boom.

Dangers of Tipping

- As a crane starts to tip, the load radius increases. As the center of gravity of the load moves away from the tipping axis, the center of gravity of the crane moves towards the tipping axis. This accelerates the rate of tipping and may leave the operator powerless to remedy the situation other than by dropping the load.
- Tipping on telescoping boom cranes may be even more rapid because of the greater weight of the boom.
- In the structural area of the load chart, crane capacities are based on the strength of its components. This means a crane may fail structurally before it tips.....so **never** use signs of tipping as an indication of a crane's ability to lift. When a crane starts to tip it is already overloaded and may incur structural damage.

Increase in Load Radius

- Reaching beyond the vertical extends the load radius and can pull the boom forward.
- A rapid swing with a load can cause the load radius to increase. The degree of swing-out may increase as the crane swings. This can also cause shock loading and twist the boom.
- Swinging a load from over the rear to over the side, or from over the front to over the side, can increase carrier deflection and extend load radius. This is especially noticeable when working on rubber.

Shock Loading

- Rapid hoist acceleration produces hook loads higher than the actual load weight.
- Sudden release of the load can cause the crane to tip backwards or even collapse.
- Pick and carry operations can subject the carrier and boom to shock loads.
- Extracting loads by jerking can overload the crane and cause shock loading.
- Shock loading can also be caused by the sudden snatching of a load or the sudden release of a frozen, caught or stuck load. Either condition can cause overloading or structural failure.

Side Loading

- Since booms are only designed to take minimal side loading, the load line should remain reasonably vertical when moving loads. Side loading can occur

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when the crane is out of level, or, during a rapid swing, or of the swing brake is applied suddenly.

- Dragging or pulling a load sideways is never permitted.

High Winds

- The force created by wind can have a devastating effect on the crane. Most crane manufactures require the load chart be reduced when operating in windy conditions. In most case crane operations should be stopped when the wind exceeds 30 mph.
- High winds can cause the operating radius to increase by swing the load forward.
- The effect of wind on the crane increased four times if the wind speed doubles.
- High winds can cause side loading.

Working near power lines

- Use extreme caution when working near power lines during windy conditions. Even slight winds can move power lines a significant distance, especially if there is a long span between power line supports.
- Whether hoisting, booming, swinging, or traveling, the crane must be operated slowly and with extreme caution.
- Maintain your distance from power lines. No part of the crane or load must ever enter the "prohibited zone". This zone must be expanded as the kV increases (see table below). Certain environmental conditions, such as fog, smoke or precipitation, may also require this distance to be increased.
- Consider erecting guard structures or barricades around power lines as a constant reminder to all personnel. Set the crane up as far as practically possible from the prohibited zone.

Required Clearance For Operations Near High Voltage Power Lines:	
to 50 kV	10 ft.
over 50 to 200 kV	15 ft.
over 200 to 350 kV	20 ft.
over 350 to 500 kV	25 ft.
over 500 to 700 kV	35 ft.
over 700 to 1000 kV	45 ft.

the

6.0 Dedicated Spotter

- From the cab, it is difficult for the operator to judge distances accurately. Therefore, any time the crane is working within a boom's length of the prohibited zone, a dedicated spotter shall be appointed.
- To be considered a dedicated spotter, the requirements of 29 CFR 1926.1428 Signal Person qualifications must be met and this person's sole responsibility is to watch the separation between power line and the equipment, load line and load (including rigging and lifting accessories), and ensure through communication with the operator that the applicable minimum approach distance is not breached.

7.0 Situational Awareness

The qualified rigger must be familiar with the following site specific considerations.

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- Being involved with reviewing lift requirements with site supervisor, crane operator and crew. This will include the pre-lift safety meeting.
- The pre-lift safety meeting should include ensuring the area for the crane is adequately prepared. The preparation includes but not limited to the following:
 - 1) Access roads for the crane and associated equipment
 - 2) Sufficient room to assemble and disassemble crane
 - 3) An operating area that is suitable for the crane with respect to levelness, surface conditions, support capability, proximity to power lines, excavations, slopes, underground utilities, subsurface construction and obstructions to crane operation
 - 4) Traffic control necessary to restrict unauthorized access to the crane working area
- Ensuring that conditions which may adversely affect crane operations are addressed. Such conditions include but are not limited to the following:
 - 1) Poor soil conditions
 - 2) Wind velocity or gusting winds
 - 3) Heavy rain
 - 4) Fog
 - 5) Extreme cold
 - 6) Artificial lighting
- Know how to identify and avoid hazards and obstacles
- Understand the established emergency procedure

8.0 Main Cause of Crane Accidents

More than half of all mobile crane accidents (54.1%) were directly related to machine set-up.

Support Failure: 31.5%

- Ground giving way and subsiding beneath outrigger blocking
- Soft Footing with crawler crane
- Outrigger blocks fall off
- Crane slips off blocks

Failure To Use Outriggers: 22.6%

- Operator neglects when setting up
- Lifting boom without outriggers
- Changing boom and counterweights without outriggers

Operator Error: 33.1%

- Inexperience, i.e., violent control movements
- Boom out beyond safe working radius
- Overload
- Overturn while traveling
- Out of level
- Boom collapse backward

Machinery and Structural Failure: 11.2%

- Boom hoist failure
- Brake failure
- Booms
- Outriggers

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High Wind: 1.6%

- Wind force sufficient to topple boom or crane

9.0 Cause of Mobile Crane Fatalities

- Electrocution: 44%
- Rigging Mishap or Failure: 15%
- Load Handling (struck by or crushed): 14%
- Operator Error: 7%
- Overload: 7%
- Dismantling Boom: 5%
- Wire Rope Failure: 3%
- Struck by Crane: 3%
- Miscellaneous: 3%

10.0 Rigging Safety Rules

- Know the weight of the load
- Know the center of gravity of the load
- Make the load attachment directly above the center of gravity of the load
- Select the hitch that will hold and control the load
- Know the rated capacity of slings and hardware
- Select the best sling suited for the load
- Inspect all rigging before the lift
- Protect the sling from sharp surfaces
- Conduct sling loading calculation and understand the decreased sling capacity cause by sling angle
- Allow for D/d ratio on all wire rope slings
- Calculate reductions when using choker hitch
- Keep personnel clear from lift area
- Lift load a few inches then check rigging before lift
- Know the limitations of all components used for the lift
- Lift slowly and stop slowly
- Never replace a shackle pin with a bolt

11.0 Rigging Equipment

- Rigging equipment must be inspected by a Competent Person before each use and as necessary during its use to ensure it is safe
- Tag and remove defective equipment from service
- Custom design grabs, hooks, clamps, or other lifting accessories, for such units as modular panels, prefabricated structures and similar materials must be marked to indicate safe working load capacities and be proof tested to 125% of their rated load

Alloy Steel Chain & Welded Alloy Steel Chain Slings

- Must have permanently affixed durable identification tags stating; size, grade, rated capacity; and; sling manufacturer
- Job or shop hooks and links, or, makeshift fasteners, formed from bolts, rods, ect., or other such attachments shall not be used
- There are four grades of chain (Grade 28, 43,70 & 80). **ONLY Grade 80 alloy steel chain shall be used for overhead lifting**

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- Alloy steel chains must be inspected frequently by the user
- Inspection must be link by link including all attachments
- Competent Person inspections must be performed at least once a year or more frequent based on; frequency of use; severity of service conditions; nature of lifts being made; and; experience gained on the service life used in similar circumstances
- Competent Person inspections must be documented and available

Wire Rope Slings

- Protruding ends of strands in splices on slings and bridals shall be covered or blunted
- Wire rope shall not be secured by knots
- Except for eye splices in the ends of wires and for endless rope slings, each wire rope used in hoisting or lowering, or in pulling loads, shall consist of one continuous piece without knot or splice
- Wire rope slings shall not be shortened with knots, bolts or other makeshift devices
- Legs shall not be kinked
- Basket hitch shall have the loads balanced to prevent slippage
- Wire rope slings shall be padded or protected from sharp edges
- Hands and fingers shall never be placed between the sling and its load while the sling is being tightened around the load
- A sling shall never be pulled from under a load when the load is resting on the sling
- When U-bolt wire rope clips are used to form eyes, the U-bolt shall be applied so that the "U" section is in contact with the dead end of the rope – **"Never saddle a dead horse"!**

Synthetic Webbing (nylon, polyester, and polypropylene)

- The employer shall have each synthetic web sling marked or coded to show; name or trademark of manufacture; rated capacity for the type of hitch; and; type of material
- Webbing shall be removed from service immediately if there is evidence of; acid or caustic burns; melting or charring of any part of the sling surface; snags, punctures, tears or cuts; broken or worn stitches; distortion of fittings.

Shackles, Hooks and Eyebolts

- Inspect prior to use and immediately remove from service if there is any evidence of stretching or cracks
- Never attempt to straighten deformed shackles, hooks, or, eyebolts
- The use of "homemade" hooks, shackles, or, other makeshift fasteners is prohibited
- Shackle pins must fit freely, without binding, and seat properly
- Eyebolts used for hoisting must be fabricated from forged carbon steel or alloy steel
- Carbon steel eyebolts must have the manufacturers name or identification trademark forged in raised characters on the surface of the eyebolt
- Alloy steel eyebolts must have the symbol "A" (denoting alloy steel) and the manufacturers name or identification trademark forged in raised characters on the surface of the eyebolt

<p>Safety Manual</p> <p>SILICA EXPOSURE CONTROL PLAN</p>

Policy Section No.:64
Revision No.: 1

Effective: 06-16
Revision Date: 11/16
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SILICA EXPOSURE CONTROL PLAN

1. Purpose:

- 1.1 To protect our workers and ensure they do not come into contact with silica in excess of the Permissible Exposure Limit (PEL) of 50 ug/m³ and that whenever they are feasible, engineering and work practice controls will be established and implemented to reduce and maintain exposures at or below the PEL.

2. Scope:

- 2.1 This applies to all work activities within Therma including but not limited to the service department, pipe fitting, plumbing, and sheet metal.

3. Definitions:

- 3.1 Silica – Silica is a natural mineral that comes in several forms, some more hazardous than others. Typically it's the crystalline forms that are of greatest concern. Silica can be present in large quantities in certain types of rocks and sand. Exposure to respirable (airborne) crystalline silica dust during construction activities can cause serious respiratory disease.
- 3.2 Employee Exposure – The exposure to respirable crystalline silica that would occur if the employee were not using respiratory protective equipment
- 3.3 Permissible Exposure Limit (PEL) – The maximum permitted 8-hour time-weighted average concentration of an airborne contaminant. The PEL of silica is 50 mg/m³.
- 3.4 Dust Containment Device – A device attached to a power tool such as a pouch, bag, plastic container, or similar attachment which is intended to capture dust generated by the power tool. This device is not intended to be a dust reduction system as defined under this section.

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- 3.5 Dust Reduction System – Technology that utilizes the application of water or local exhaust ventilation to reduce airborne dust generated by the use of powered tools or equipment. Local exhaust ventilation may include vacuum systems, dust collection systems, and dust exhaust systems.

4. Training

- 4.1 In the event a Therma employee could come into contact with silica; they shall receive silica awareness training.
- 4.2 If respirators or other personal protective equipment are required, the employees shall receive the appropriate respirator training in accordance of the company policies.
- 4.3 Equipment and training will be provided at no cost to employees.
- 4.4 When operations include using powered tools or equipment to cut, grind, core, or drill concrete or masonry materials, Therma shall provide training on the following topics to all employees prior to their assignment to jobs or work areas where Therma will be conducting these operations:
- The potential health hazards of overexposure to airborne dust generated from concrete and masonry materials, including silicosis, lung cancer, chronic obstructive lung disease (COPD) and decreased lung function.
 - Methods used to control employee exposures to airborne dust from concrete and masonry materials, including wet cutting, local exhaust ventilation systems, and isolation of the process from the operator or other employees by means of distance, enclosure, or other method, as applicable.
 - Proper use and maintenance of dust reduction systems, including the safe handling and disposal of waste materials collected in connection with their use.
 - The importance of good personal hygiene and housekeeping practices when working in proximity to dust from concrete and masonry materials including:

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- Not smoking tobacco products; appropriate methods of cleaning up before eating, and appropriate methods of cleaning clothes.
- Avoiding, to the extent practical, activities that would contribute significantly to an employee's exposure to airborne dusts.
- When training is needed contact the safety department directly.
- Training shall be conducted by a safety representative, superintendent, or their designee.
- Once training is completed originals are to remain in the job site safety training files until job completion and an electronic/ scanned copy shall be sent to the Therma Safety Dept. to be kept on file within one week.

5. Engineering Controls

- 5.1 Alternative Exposure Control Methods are necessary when effective engineering controls required by "Table 1" of OSHA's Respirable Crystalline Silica Standard are not achievable. When acceptable, engineering controls are feasible Therma will always defer to, and comply with "Table 1" of OSHA's Respirable Crystalline Silica Standard.

6. Safe Work Practices

- 6.1 Procedures shall be implemented to ensure that dust reduction systems maintain their effectiveness for dust reduction throughout the work shift.
- 6.2 Dust reduction systems shall be installed, operated, and maintained in accordance with manufacturer recommendations to the extent they exist.
- 6.3 When engineering controls, such as the wet method, HEPA filtered dust collection systems, and local exhaust ventilation are by themselves inadequate for worker protection from overexposure, but feasible to use, they will be implemented in conjunction with

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respirator use to help control respirable crystalline silica concentrations.

- 6.4 Only sharp masonry drill bits and saw blades will be used when drilling or cutting into concrete.
- 6.5 Affected workers are not permitted to eat, drink, smoke, or apply cosmetics in affected work areas.
- 6.6 Affected workers are required to wash their hands and faces before eating, drinking, smoking, or applying cosmetics.
- 6.7 Contact Therma's Safety Department in advance of working in an area with potential silica exposure to arrange air monitoring to ensure the silica exposure is below OSHA's Permissible Exposure Limit (PEL) 50 mg/m³

7. Affected Area Access Restrictions

- 7.1 Therma restricts access by all others to areas where Therma workers are drilling, cutting, or boring through concrete and restricts access to its own affected workers who must perform work in areas where other trades are pulverizing silica containing building materials.
- 7.2 When necessary, to minimize exposure Therma will ensure:
 - The affected work area will be barricaded, and marked yellow and black caution tape.
 - The barricaded area will be large enough to prevent other trades in the area from overexposure to respirable crystalline silica, provided that they do not breach the barricade.
 - Signs stating, "Caution – Silica" will be posted around the perimeter of the barricaded areas so that other trades will know why they should not to breach the barricade.

8. Clean Up

- 8.1 Minimize dust generation when working with or around silica-containing materials.

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8.2 Never use compressed air to clean off equipment, surfaces or your clothes. Where feasible, use water or a HEPA vacuum. Consider using disposable (such as Tyvek coveralls) or reusable clothing that stays at the work site.

8.3 Handle and dispose of waste materials without generating airborne dust

- Use a HEPA vacuum, squeegee instead of broom, or sweeping compound, in that order.

9. Respiratory Protection:

9.1 Reference Therma's policy section No. 27 Respiratory Protection