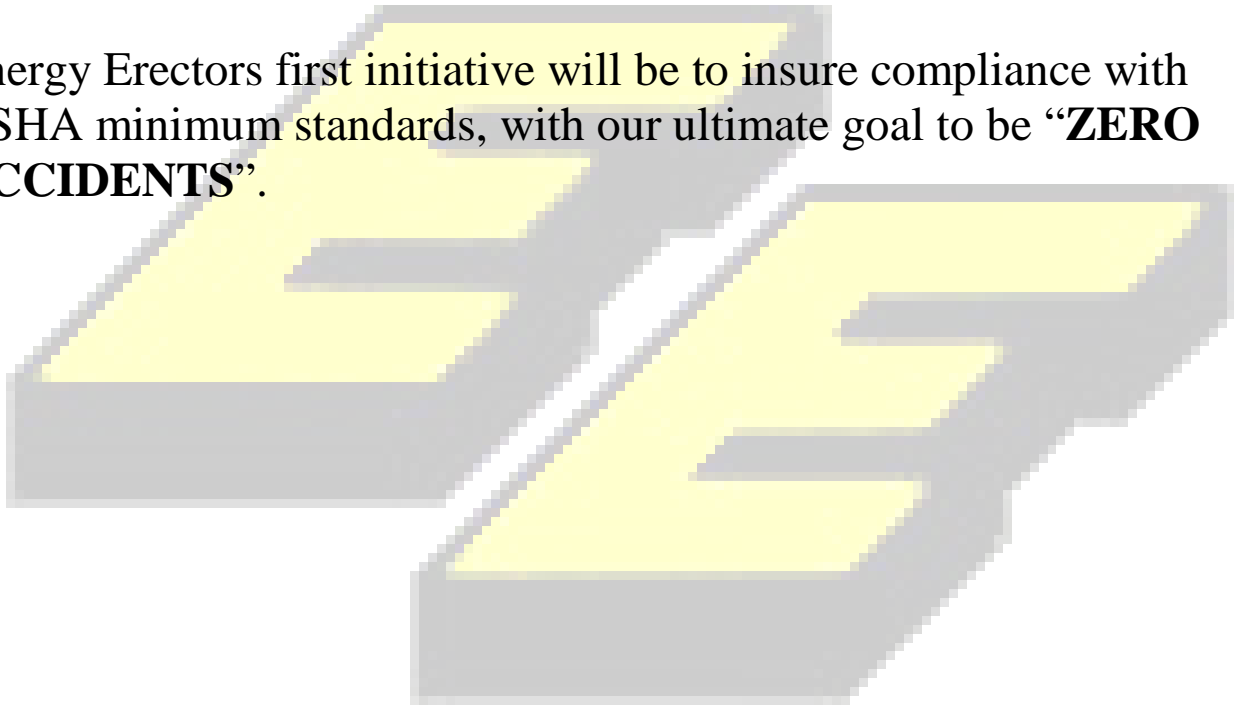


Energy Erectors Safety Statement

Energy Erectors, Inc. is committed to provide a safe and healthy workplace for its employees. Safety is a major criterion to ensure that each and every employee returns daily to their homes and families. We have initiated a program we feel will assure accident free worksites with Safety Training and a Drug and Alcohol Free Workplace.

Energy Erectors first initiative will be to insure compliance with OSHA minimum standards, with our ultimate goal to be “**ZERO ACCIDENTS**”.



SEPTEMBER 2008

ENERGY ERECTORS, INC.

SAFETY POLICY AND SAFETY PROGRAM

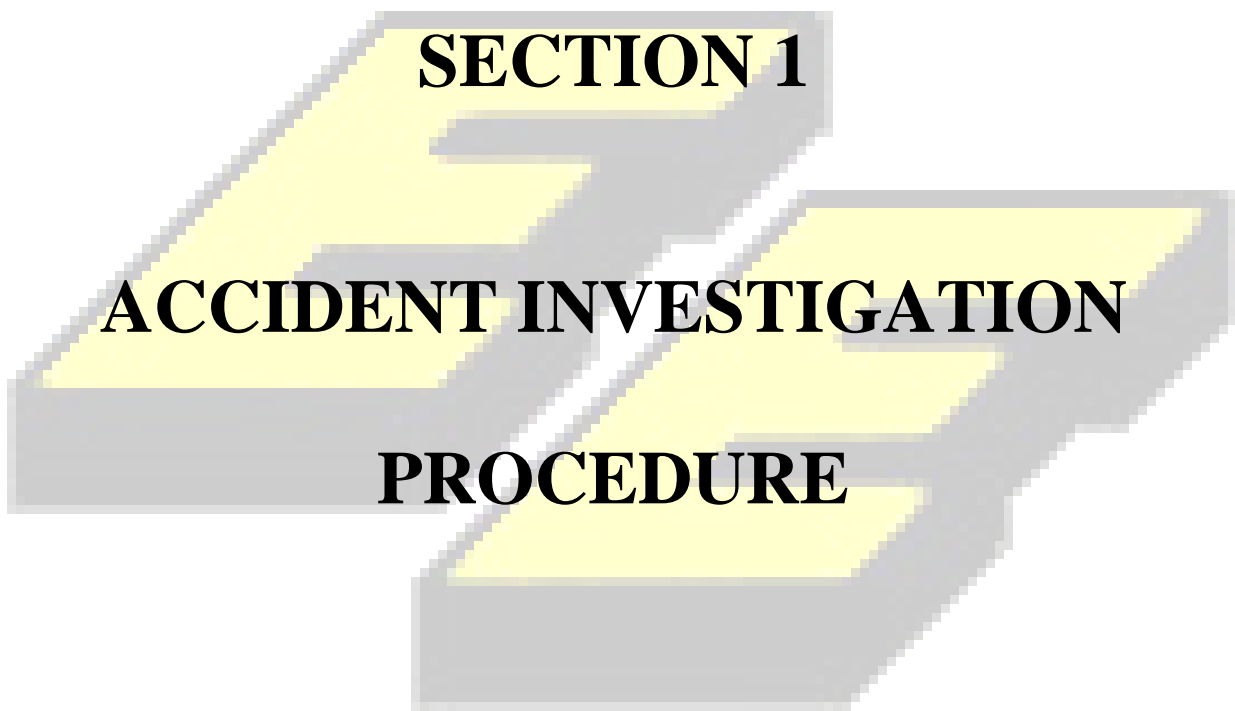


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SECTION 1

ACCIDENT INVESTIGATION

PROCEDURE

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1. Purpose
2. Accident Classification
3. Reporting Procedure
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7. Near Miss Accidents
8. Training
9. Emergency Numbers
10. Accident Report Form

Exhibit A

See Reference Section at the back of this manual for more available materials.

ACCIDENT REPORTING AND INVESTIGATION

I. PURPOSE

A. Reporting

1. All accident/ incidents resulting in injury, illness or property damage that involves ENERGY ERECTORS, INC. will be immediately reported to ENERGY ERECTORS, INC. The superintendent or on-site safety representative will investigate and submit a written report with preventative measures taken to prevent a reoccurrence of the accident/incident. Each accident/incident investigation shall be monitored by ENERGY ERECTORS, INC. Safety Department.

II. ACCIDENT CLASSIFICATION

A. Non-Serious

1. Non OSHA recordable (First Aid Only)

B. Serious

1. Any accident/incident that involves a doctor's care.
2. All property damage accidents.

C. Very Serious

1. Fatality
2. Requires hospitalization
3. Lost time

III. ACCIDENT/INCIDENT REPORTING PROCEDURE

A. All accidents/incidents will be reported immediately to ENERGY ERECTORS, INC. Safety Department.

1. The initial reported immediately to Energy Erectors, Inc. Safety Department.
2. All very serious accident reports shall be reported immediately, regardless of the day, or time of day, to a member of the Safety Department and/or the Project Manager of Energy Erectors, Inc. This will enable the emergency plan to be activated if necessary.

B. A written accident/incident report shall be submitted within 24 hours to Energy Erectors, Inc. Safety Department by fax or U.S. Mail.

C. Property owners and Labor Union Safety Representatives shall be advised of the accident/incident.

1. Property damage accidents/incidents require notification of local law enforcement agencies.
- D. Supplementary reports shall follow in a timely manor.
1. Change in accident status or up-date on status.
 2. Conclusion of investigation showing procedures taken to eliminate possibility of a similar accident/incident.

IV. ACCIDENT REPORT FORMAT

- A. The investigative report form (shown in exhibit A) shall be completed as soon as possible. It should be an accurate and detailed description of the operation being performed at the time of the accident.
- B. The investigative report form shall contain the following information.
1. Who
 - a. Name, address, phone, age, date of birth, sex, marital status, social security number and occupation.
 - b. Medical treatment
 1. First aid, where, when and administered by whom.
 2. Attending Physician, hospital, address, date and time.
 - c. Work Status
 1. Did employee return to work on day of injury/incident?
 2. When is employee expected to return to work?
 3. What restrictions have been placed on work activity, if any?
 2. When
 - a. Date and time of accident/incident.
 - b. Date and time accident reported.
 - c. Date and time of medical treatment.
 - d. Time- Activity prior to accident.
 - e. Time-of occurrence.
 - f. Time-notification of first aid, safety, ambulance call, etc.
 - g. Time-arrival at scene, first aid team, ambulance, etc.
 - h. Time- initial treatment or rescue efforts began
 - i. Time- arrival of ambulance at medical facility.
 3. Where
 - a. Job location
 - b. Job number
 4. What
 - a. Description of what happened.
 - b. Procedures put in place so that accident/accident does not reoccur.
 5. Why
 - a. Were proper procedures followed?

- b. Was there equipment failure involved?
- c. Was there employee negligence involved?

V. INVESTIGATION PROCEDURE (Very Serious Accidents)

A. Purpose

- 1. The purpose of any accident investigation is to identify all possible causes so that future accidents can be prevented. This will also help to determine all facts, which may have a bearing on legal liability. Investigations should be directed toward fact-finding, and not designation of blame.

B. Investigation Team

- 1. Project Manager/Superintendent/Foreman
- 2. On-site Safety Representative/Safety Director

C. Conducting the Investigation

- 1. The investigation should begin as soon as possible.
- 2. All efforts must be made to secure the area of the accident/incident to prevent any alteration of the scene prior to the investigation.
- 3. It is in the best interest of all parties that all physical evidence not be disturbed or tampered with until the investigation has been completed and the Energy Erectors, Inc. Superintendent and /or on-site Safety Representative concur.
- 4. If any equipment, tools and /or materials are involved with the accident/ incident they shall be removed from service and be placed in safekeeping. If this is impractical, the area in which the accident/incident occurred shall be cordoned off and a security person shall post to keep all unauthorized personnel out of the area.
 - a. Equipment, tools and/or material to be removed should be photographed in their original location before removal from scene.
 - b. In some cases it may be necessary to mark the location of items to be removed with colored chalk.
 - c. A detailed list or inventory shall be made of items removed from the scene and/or service.
 - d. The tools, equipment and/or materials shall be tagged as being out of service and kept in a safe location. The items in question shall only be returned to service after the conclusion of the investigation and are found to be in good working order. The return to service shall be at the discretion of the Energy Erectors, Inc. Superintendent.
- 5. The secured area shall only be opened upon approval from the Energy Erectors, Inc. Superintendent or on-site safety representative.

D. Photographs, Drawings and Diagrams

1. The supervisor and / or on-site safety should take sufficient photographs as soon as possible.
 - a. The initial photographs should be made of the untouched scene. These should be from eye level, showing the accident scene in relationship to the general area. If possible the scene should be photographed from several different angles.
 - b. Close up photographs shall be taken to show greater detail.
 1. An assistant may be used to point to an area or object.
 2. A ruler may be placed next to an object to show exact size. A second photograph should be taken to show the location of the object in relationship to the general scene.
 - c. "Posed" photographs can be made to illustrate statements of a witness. A person with the same general physical appearance should be used, providing it does not put them in imminent danger.
 - d. Each photograph shall be labeled as follows:
 1. Date and time of photograph.
 2. Name of photographer and any assistant.
 3. Brief description of what the photograph shows.

E. Interviews and Statements

1. Discuss the accident with the involved employee as soon as possible.
2. Discuss the accident with any and all witnesses that may have seen the accident.
3. While conducting the interviews consider the following:
 - a. What was the employee doing prior to and at the time of the accident?
 - b. Was the employee properly instructed as to the manner in which to perform his duties? Did he work in accordance with these instructions?
 - c. Does the employee differ physically or mentally from other employees doing the same work?
 - d. Did any other employee contribute to this accident?
 - e. Were the equipment and tools in good operating condition? Were they suited for the job? Were they properly used?
 - f. Was there proper lighting?
 - g. Was good housekeeping maintained?
 - h. How is the same type of work done by other employees?
 - i. Is there a safer way to perform the work?
 - j. Was the employee in good health when reporting to work to work on the site of the accident?
 - k. Did the employee appear to be preoccupied or have other personal issues?
4. Written statement should be obtained from the employee involved in the accident and from all witnesses.
 - a. All information obtained during the interviews should be limited to direct knowledge of what was observed; keep the information factual.
 - b. Each individual interviewed should be asked to sign a statement of his/her recorded sequence of events that let up to and including the incident.

- c. The statement from each individual interviews should include the following:
 - 1. Name, address, phone numbers, employer, employee classification, occupation or trade.
 - 2. Date, time and place of the interview.
 - 3. Where the person was at the time of the accident.
 - 4. A narrative of what the witness knows of the accident.
 - 5. What occupational event was taking place prior to and at the time of the accident?
 - 6. What material, equipment, tools, and conditions were involved? This should include all possible contributing factors, personal and physical, whther relating directly or indirectly to the accident.
 - 7. What facts may have caused the accident? Answers must be as objective as possible, include all safe and/or unsafe acts.
 - 8. Were there any known and/or reported pre-existing unsafe conditions or actions associated with the accident? If so, when and to who was it reported, and was action taken?
- d. Upon conclusion of the interview, review the statement with the witness and attempt to clear up any possible discrepancies. All statements should be dated and signed.

F. Alcohol and Drug Testing

- 1. It is the policy of Energy Erectors, Inc. to provide a healthy and safe working environment for its employees and for those with whom we work by assuring that all employees are fit for duty while on the job. Employee involvement with alcohol or drugs can adversely affect the work environment, job performance, safety, security, and customer confidence. Please be advised that employees and applicants may be subject to testing for the presence of alcohol, drugs or controlled substances. All testing will be a t the discretion of Energy Erectors, Inc. and in compliance with applicable laws concerning drug and alcohol testing. Drug and /or alcohol testing may be done for the following reasons: reasonable suspicion, post accident, pre-employment, and random. Commercial Motor Vehicle (CMV) operators will be governed by the U.S. Department of Transportation (D.O.T.) Federal Motor Carrier Safety Regulations. .
- 2. The use, possession, distribution, manufacture or dispensing of unlawful drugs while on duty or during working hours, or reporting for work or working while under the influence of, or impaired by alcohol, controlled substances or any other drug, the unauthorized possession on work premises of alcohol, controlled substances or any other drug, or the possession of a drug paraphernalia are strictly prohibited and are all cause for immediate discharge.

VI. SUMMARY

- A. At the conclusion of a major accident investigation, a meeting will be held at the site of the accident assure the cause has been determined and proper corrective action has been initiated.
- B. All job site personnel shall attend this meeting. It is intended that each employee will receive complete and accurate information as to the causes of the accident. Also, that necessary action or corrective measures have been taken to prevent a reoccurrence of the accident.
- C. In the case of a serious or very serious accident a post accident safety meeting should be held with all site employees. The purpose would be to express investigation results and corrective actions if necessary.

VII. NEAR MISS ACCIDENTS

- A. Oftentimes accidents “almost” happen. We must take these near misses as a warning sign that unless a remedy is provided the next time will not be so lucky. To accomplish accident prevention, all near misses shall be investigated as if an accident had occurred.

VIII. TRAINING

- A. All Supervisory personnel will receive training in accident investigation procedures and in completing the accident investigation report. Initial training will be provided and subsequent training anytime this procedure is updated.

IX. ENERGY ERECTORS, INC (352) 787-3878

- A. Main Office personnel to be contacted in the event of a very serious accident.
 - 1. Paul Yeckley- Safety Director
Office- 352-787-3878 ext. 2237
 - 2. William Beers- President
Office- 352-787-3878 ext 2224
Home- 352-323-8356
 - 3. Scott McConnell – Project Manager/Estimator
Office- 352-787-3878 ext. 2230
Home- 352-398-6064
 - 4. Todd Dario- Vice President Utility Division
Office- 352-787-3878 ext. 2232
Home- 352-748-6682



ENERGY ERECTORS, INC.

ELECTRICAL CONTRACTORS

ACCIDENT REPORT

Fax this report to Paul Yeckley within **24 HOURS** following any injury:
In case of serious injury or illness, call Paul Yeckley or Bill Beers **IMMEDIATELY**.
Phone: 352-787-3878 ext. 2237 Fax: 352-787-6407

EMPLOYEE INFORMATION:

Employee Name: _____ Social Security Number: ____/____/____
Address: _____ City: _____ State: _____ Zip Code: _____
Age: _____ Birth Date ____/____/____ Sex: Male [] Female [] Marital Status: Single [] Married []
Occupation: _____ Job Location: _____ Job Number : _____

ACCIDENT INFORMATION:

Date of Injury ____/____/____ Time: ____:____ AM [] PM []
Date Employee Reported Injury: ____/____/____
Nature Of Injury: _____
Describe What Happened: _____

Did Employee Receive First Aid: Yes [] No [] If Yes By Whom: _____

Doctor Or Hospital Employee Went To:

Doctor

Hospital

Phone: _____ Phone: _____

Did Employee Return To Work On Their Injury Date: Yes [] No [] If No Expected Date: _____

Do You Expect Restricted Activity: Yes [] No [] If Yes, How Long: _____

Was There Any Property Damage: Yes [] No [] If Yes, Explain: _____

Names of Witnesses: _____, _____, _____

Save All Evidence: Pictures Needed of Equipment/Accident Scene: Yes [] No [] NA []

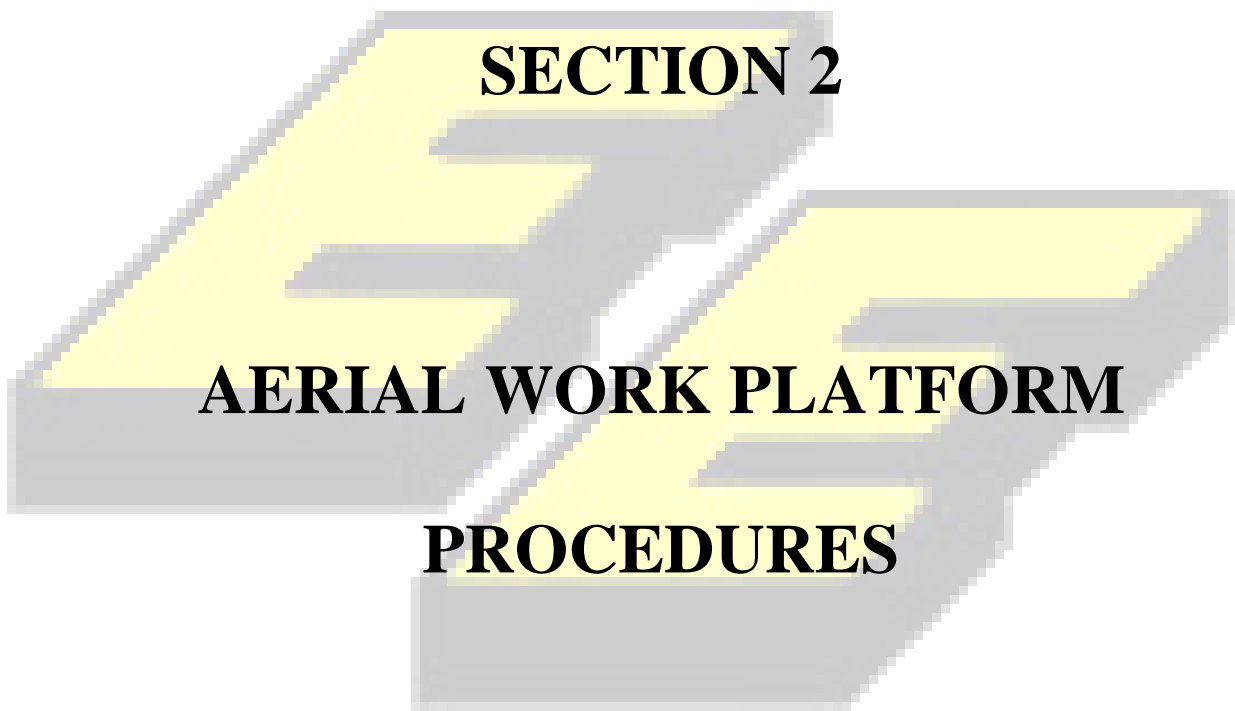
Date of Report: ____/____/____ Superintendents Signature: _____

I Certify That The Above Statements Are True and Complete To The Best Of My Knowledge.

Employee Signature: _____ Date: _____

Any person who, with the intent to defraud or knowing that he/she is facilitating a fraud against an insurer submits an application or files a claim containing a false or deceptive statement is guilty of insurance fraud.

CC: Original- Jerry Schinderle
Accident File via EG, BJY
Job Safety File



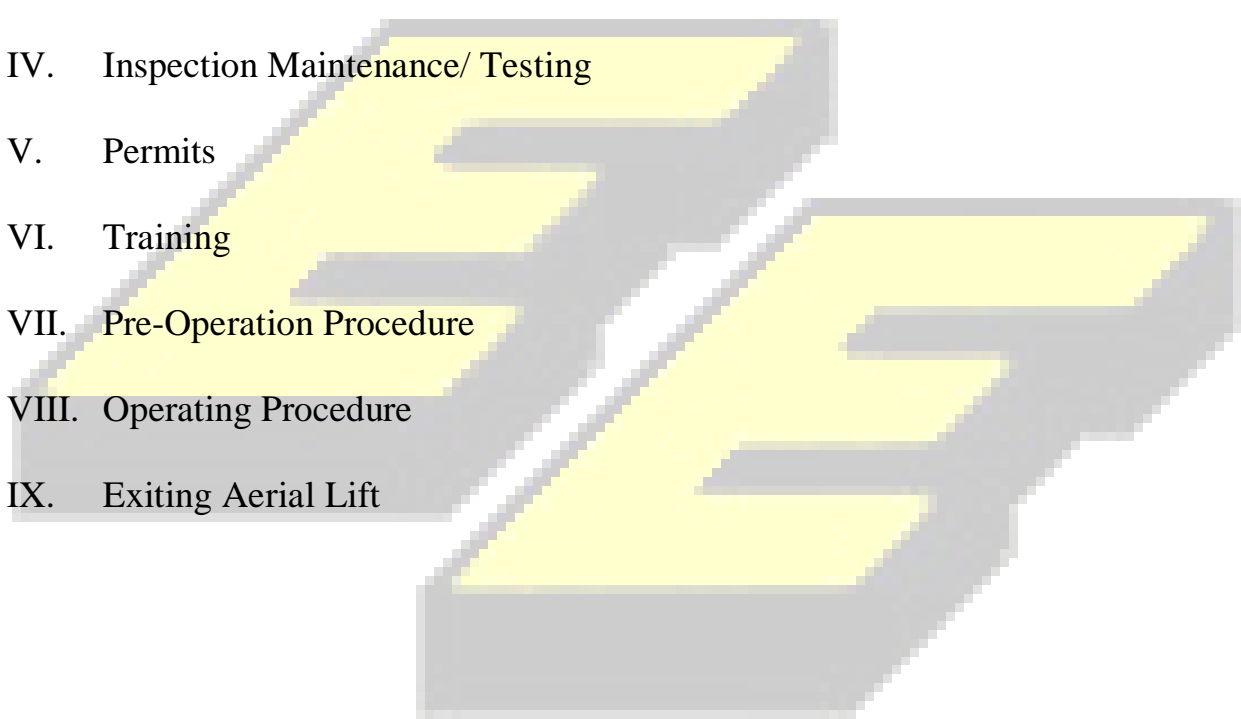
SECTION 2

AERIAL WORK PLATFORM

PROCEDURES

AERIAL WORK PLATFORM PROCEDURES

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 - II. Scope
 - III. Definitions
 - IV. Inspection Maintenance/ Testing
 - V. Permits
 - VI. Training
 - VII. Pre-Operation Procedure
 - VIII. Operating Procedure
 - IX. Exiting Aerial Lift
- 

AERIAL WORK PLATFORM PROCEDURES

I. Purpose

To protect the health and welfare of all ENERGY ERECTORS, INC. employees from safety hazards associated with the operation of aerial work platforms.

II. Scope

This procedure applies to all employees working for ENERGY ERECTORS, INC. that operate aerial work platforms.

III. Definitions

Aerial Device or Aerial Work Platform- An entire device that is designed and manufactured to raise personnel to an elevated work position on a platform supported by scissors, masts or booms.

Articulating Boom- An aerial device that has two or more hinged boom sections.

Authorized Person- A person who is approved and assigned to perform specific types of duties by the employer and who is qualified to perform those duties due to his/her training or experience.

Commercial Chassis- A vehicle that is built for over-the-road travel.

Extensible Boom- An aerial device, except for the aerial ladder-type, that has a telescopic boom.

Insulated Aerial Device- An aerial work platform that is designed with dielectric components to meet specific electrical insulating ratings.

Mechanically Positioned- That the elevating assembly, whether a mechanical (cable or chain), hydraulic, pneumatic, electric or powered mechanism is used to raise or lower the platform.

Platform- The portion of an aerial work platform, such as a bucket, basket, stand, cage or the equivalent, that is designed to be occupied by personnel.

Qualified Person- A person who possesses a recognized degree, certificate or professional standing, or skill and who, by ability to deal with problems relating to the subject matter, the work or the project.

Vertical Tower- An aerial device that is designed to operate vertically on a level surface.

IV. INSPECTION – MAINTENANCE AND TESTING

ENERGY ERECTORS, INC. Will comply with all of the following requirements:

Each aerial work platform shall be inspected, maintained, repaired and kept in safe working condition in accordance with the manufacturer's or owners operating or maintenance and repair manuals.

All aerial lifts are to be inspected prior to each use to make sure it is in safe working condition. A thorough annual inspection with record of dates and results of the inspection are maintained at our corporate headquarters.

Any aerial work platform found not to be in a safe operating condition should be removed from service until repaired. All repairs shall be made by an authorized person in accordance with the manufacturer or owner's operating or maintenance and repair manuals.

IF the aerial work performed is rated and used as an insulated aerial device, the electrical insulating components shall be tested for compliance with the rating of the aerial work platform in accordance with ANSI A92.2-1992.

Such testing shall comply with all of the following provisions:

The test shall be performed not less than annually.

Written, dated, and signed test reports shall be made available by ENERGY ERECTORS, INC. for examination by a Department of Labor Representative.

The insulated portion of an aerial device shall not be altered in any manner that might reduce its insulating.

All danger, caution and control markings and operational plates shall be legible and not obscured.

V. PERMITS

This section applies to operation within the State of Florida only.

ENERGY ERECTORS, INC. shall provide the operator of an aerial work platform with an aerial work platform permit.

A permit shall be carried by the operator or be available at the job site and shall be displayed upon request by a Department of Labor Representative.

A permit shall indicate the type of aerial work platforms an operator is qualified to operator is qualified to operate.

A permit to operate an aerial work platform is valid only when performing work for ENERGY ERECTORS, INC. and shall be issued for a period of not more than three (3) years.

A permit shall contain all of the following information:

- Operators name
- Name of issuing authority
- The types of aerial work platforms the operator is authorized to operate.
- Date issued
- Expiration date

VI. TRAINING

ENERGY ERECTORS, INC. will provide each employee who will operate the aerial work platform with instruction and training regarding the equipment before a permit is issued or reissued. Such instruction and training shall ensure that each operator is in compliance with the minimum following provisions.

They are instructed by a qualified person in the intended purpose and functions of each of the controls.

They are trained by a qualified person or read and understand the manufacturer or owners' operating instructions and safety rules.

They understand by reading the operating manual or by having a qualified person explain all decals, warnings and instructions displayed on the aerial work platform.

They read and understand the provisions of this sub-rule or are trained by a qualified person on its content.

VII. PRE-OPERATION PROCEDURES

Before use in each work shift, an aerial work platform shall be given a visual inspection by the operator for defects that would affect its safe operation and use. Visual inspection will be done for all of the following:

- Cracked Welds
- Bent or broken structural members

- Hydraulic or fuel leaks
- Damaged controls and cables
- Loose wires
- Tire condition
- Fuel and hydraulic fluid levels
- Slippery conditions on the platform
- Operate all platform and ground controls to ensure that they perform their intended functions and all controls are clearly marked.
- Check operation of safety interlocks
- Follow pre-operation checklist found in operator manual

Before the aerial work platform is used, and during use on the job site, the operator shall inspect for all of the following.

- Ditches, drop-offs and holes
- Bumps and floor obstructions
- Debris
- Overhead obstruction and power lines

All unsafe items found as a result of the inspection of the aerial work platform or work area will be corrected before further use of the aerial work performed.

When proper clearances cannot be maintained, the owner of the electrical lines or his authorized representative will be notified and provided with all pertinent information before the commencement of operations near electrical lines.

Any overhead wire shall be considered to be an energized line until the owner of the line or his authorized representative states that it is de-energized and grounds are installed.

VII. OPERATING PROCEDURES

The aerial work platform shall be used only in accordance with the manufacturer or owner's operating instructions and safety rules.

When operating aerial work platforms or other equipment under, over, by or near energized electric power lines, the following clearances shall be maintained:

| <u>Voltage</u> | <u>Minimum Clearance</u> |
|----------------|--------------------------|
| 0-50kV | 10 Feet |
| Over 50 kV | 10 Feet + .4 Inch per kV |

Always ground aerial lifts when working in energized substations.

The clearance requirements set forth in the above do not apply to the following situations:

Where work is performed from an insulated aerial device, which is insulated for the work and the work is performed in accordance with the provisions of Construction Safety Standards Part 16 Power Transmission and Distribution of the Florida Administration Code or OSHA Subpart V Power Transmission and Distribution (1926.950 to 1926.960).

Where the electric power transmission or distribution lines have been de-energized and visibly grounded at the point of work or where insulating carriers that are not a part of an attachment to the aerial work platform have been erected to prevent physical contact with the line.

Where work is being performed by two (2) licensed journeyman electricians on equipment up to .5kV.

The two (2) journeymen will be required for work within the minimum clearance on equipment over .5kV.

The manufacturer's rated load capacity shall not be exceeded. The employee shall ensure the load and its distribution on the platform are in accordance with the manufacturer's specifications. The aerial work platform rated load capacity shall not be exceeded when loads are transferred to the platform.

The guardrail system of the platform shall not be used to support any of the following:

- Materials
- Other Work Platforms
- Employees

Personnel shall maintain firm footing on the platform while working thereon. The use of railings, planks, ladders, or any other device on the platform for achieving additional height is prohibited.

Fuel gas cylinders shall not be carried on platforms that would allow the accumulation of gases.

Full body harness with energizing absorbing lanyard, which is fixed to attachment point provided and approved by the manufacturer shall be provided by ENERGY ERECTORS, INC. and used by any occupant of an aerial work platform.

Belting off to an adjacent pole structure or equipment while working from an aerial work platform is prohibited.

Do not tie the platform OFF to a structure.

ENERGY ERECTORS, INC. will not allow employees to exit an elevated aerial work platform.

Only aerial work platforms that are equipped with a manufacturer's installed platform controls for horizontal movement shall be moved while in the elevated position.

Before and during driving while elevated, an operator of a platform shall do both of the following.

Look in the direction of and keep a clear view of the path of travel and make sure that the path is firm and level.

Maintain a safe distance from all of the following:

- Obstacles
- Debris
- Drop-offs
- Holes
- Depressions
- Ramps
- Overhead Obstructions
- Overhead Electrical Lines
- Other hazards to safe elevated travel

Outriggers or stabilizers when provided are to be used in accordance with the manufacturer's instructions. Outriggers and stabilizers shall be positioned on pads or a solid surface.

Aerial work platforms shall be elevated only when on a firm and level surface or within the slope limits allowed by the manufacturer's instructions.

A vehicle mounted aerial work platform (bucket truck) shall have its brakes set before elevating the platform.

A vehicle mounted aerial work platform (bucket truck) shall have a wheel chocks installed before using the unit on an incline.

Climbers shall not be worn while performing work from an aerial work platform.

Platform gates shall be closed while the platform is in an elevated position.

Stunt driving and horseplay are prohibited.

Altering, modifying, or disabling safety devices or interlocks are prohibited.

Care shall be taken to prevent ropes, cords, and hoses from becoming entangled in the aerial work platform.

A platform operator shall ensure that the area surrounding the aerial work platform is clear of personnel and equipment before lowering the platform.

Before and during travel, except as provided for horizontal movement, an operator shall do all of the following:

Inspect to see that booms, platforms, aerial ladders or towers are properly cradled or secured.

Ensure that outriggers are in a stored position

Limit travel speed according to the following factors:

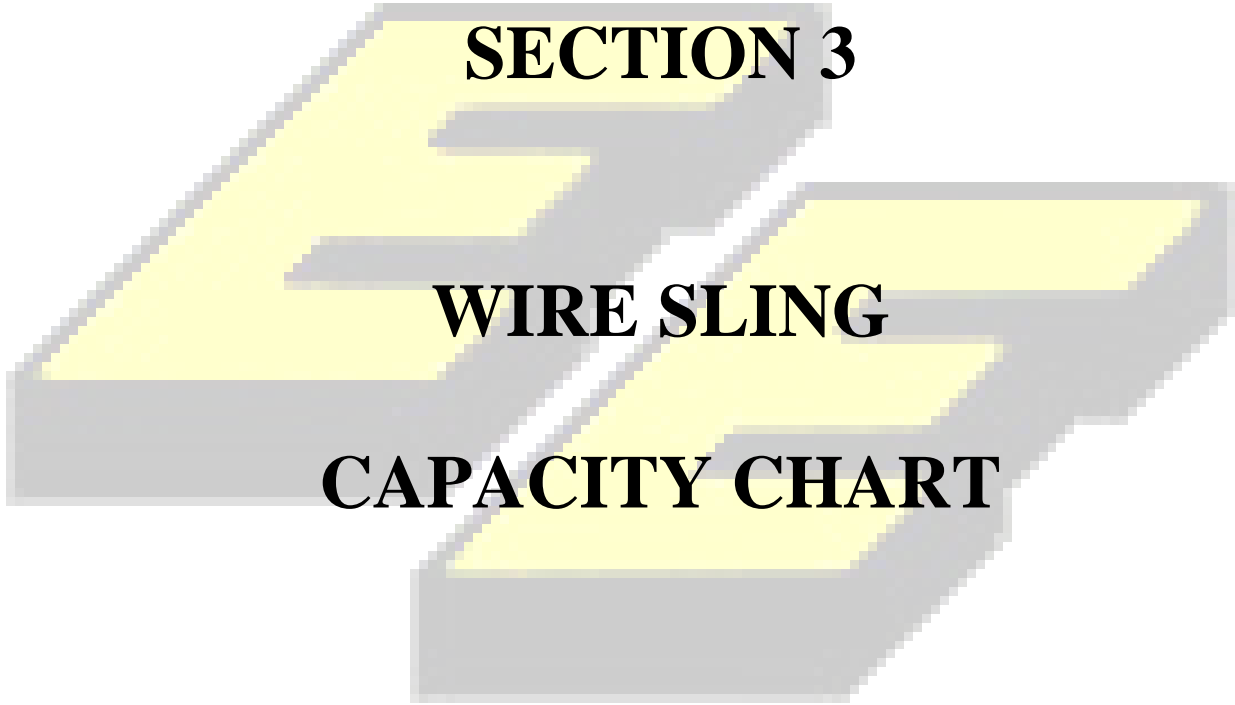
- Condition of the surface
- Congestion
- Slope
- Location of personnel
- Other hazards

The aerial work platform shall not be positioned against another object to steady the platform.

The aerial work platform shall not be operated from a position on a truck, trailer, railway car, floating vessel, scaffold or similar equipment.

The boom and platform of the aerial work platform shall not be used to move or jack the wheels off the ground, unless, the machine is designed for that purpose by the manufacturer.

If the platform or elevating assembly becomes caught, snagged, or otherwise prevented from normal motion by adjacent structures or other obstacles such that control reversal does not free the platform, all personnel shall be removed from the platform before attempts are made to free the platform.



SECTION 3
WIRE SLING
CAPACITY CHART

C. C. SHARROW COMPANY, INC.

SLING MANUFACTURER

825 PIERCE BUTLER ROUTE, ST. PAUL, MINNESOTA 55104

PHONE - 489-1341

| | | | | | | | | | |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 1/8 | 10. | 7.8 | 21. | 18. | 15. | 10. | 14. | 11. | 7.8 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|

6X37 Monitor Excellay, Independent Wire Rope Core

| | | | | | | | | | |
|--------|-----|-----|-----|-----|-----|-----|-----|------|-----|
| 1 1/4 | 12. | 9.1 | 24. | 21. | 17. | 12. | 16. | 13.0 | 9.1 |
| 1 1/38 | 15. | 11. | 29. | 25. | 21. | 15. | 19. | 16.0 | 11. |
| 1 1/2 | 17. | 13. | 35. | 30. | 25. | 17. | 23. | 19.0 | 13. |

WIRE ROPE SLINGS

➤ **CARE**

HANG SLINGS UP

➤ **USE**

NO JERKING MOVEMENTS

➤ **INSPECTION**

UNCOIL LOOPS

➤ **REPLACEMENT**

STOP KINKS

*PROTECT SLINGS ON
SHARP CORNERS*

SAFETY REQUIREMENTS FOR WIRE ROPE SLINGS

WARNING

Consult industry recommendations and OSHA standards for proper application.

DO NOT exceed rated capacity of sling. Rated capacity of sling applies to a new and unused sling. Inspect sling before each use. Tensile strength of sling may decrease with each use.

DO NOT allow sling to rotate at either end. Sling may fail if damaged, abused, misused, overused or improperly maintained.

1. Determine weight of load.
2. Select a sling of suitable capacity.
3. When in doubt use a larger capacity sling.
4. **DO NOT** run a sling around sharp corners without corner guards.
5. **DO NOT** attach sling to fittings with diameters smaller than sling rope size.
6. Avoid formation of kinks, loops or twists in the legs or sling body.
7. Examine sling for damage and worn areas.
8. Take up slack slowly to avoid shock loading the sling.
9. Use a tag line on the load if necessary to prevent sling rotation.
10. **DO NOT** use sling with hand tucked splices where rotation will allow un-laying of rope and splice.
11. **DO NOT** shorten sling using knots, clips or other means.
12. Keep sling well lubricated to resist corrosion.
13. **DO NOT** use old or used ropes for slings.
14. Discard sling if it is damaged, worn, corroded or exposed to a corrosive environment.

WIRE ROPE SLINGS CARE – USE – INSPECTION – REPLACEMENT

INSPECTION

Macwhyte Wire Rope Company has worked closely with all industries to assist in the proper selection, use, care, inspection, maintenance, and replacement of wire rope slings. Companies have accepted our recommendations and, as a result, have enjoyed excellent safety records in lifting operations.

The Occupational Safety and Health Act (OSHA) of 1970 (and its Regulations of Industrial Slings*) now makes it the LEGAL responsibility of the wire rope sling USERS to comply with the requirements of this act. Disregard of OSHA regulations by wire rope sling users can result in the levying of fines.

This brochure is intended as an aid for all wire rope sling users. To better acquaint them with the new OSHA regulations and to assist them in complying with the act.

As a wire rope sling manufacturer, the Macwhyte Wire Rope Company and its distributors do produce and deliver the finest products available for overhead lifting. But quality products, good design, and careful inspection procedures do NOT eliminate the user's responsibility and the hazards of overhead lifting. With OSHA serving as a guide, we believe the reduction of lifting hazards can be achieved by combining use of quality products with knowledge, intelligence, proven practices, care and common sense.

It is essential that personnel be thoroughly trained in the proper operation of lifting equipment and the handling of loads. Extreme care is necessary to offset the hazards of overloading, dropping, or slipping of the load cause by improper hitching, dropping, or slipping of the load caused by the improper hitching, obstructing free passage of the load, and using equipment or materials for purposes other than those for which they have been designed.

Thus, the objective of this brochure is to impart knowledge of wire rope sling properties and the proper use, care, inspection, maintenance and replacement of such slings.

*See Federal Register, Volume 40, Number 125, Part III, Dated 6-27-75, OSHO Regulations for Industrial Slings. Proof-loading and tagging of wire rope slings are not required by OSHA regulations.

CARE OF WIRE ROPE SLINGS

LUBRICATION OF WIRE ROPE SLINGS

Wire Rope Slings normally require no additional lubrication other than may be required for the prevention of corrosion or acid embrittlement when environmental conditions so dictate.

SAFE OPERATING TEMPERATURES

Fiber Core Wire Rope Slings of all grades shall be permanently removed from service if they are exposed to temperatures in excess of 200°F. When non-fiber core wire rope slings of any grade are used at temperatures above 400°F or below minus 60°F, recommendations of the sling manufacturer regarding use at that temperature shall be followed.

MINIMUM SLING LENGTHS

6X19, 6X37 and Cable-Laid Slings shall have a minimum clear length of rope ten (10) times the rope diameter between splices, sleeves or end fittings. Braided Wire Rope Slings shall have a minimum clear length of rope forty (40) times the component rope diameter between the loops or end fittings. Grommets and Endless Slings shall have a minimum circumferential length of ninety-six (96) times the grommet body diameter, rope body diameter, or cable body diameter.

STORAGE

WIRE rope Slings of all grades should be stored in an area where they will not be damaged by: **Moisture, extreme heat, corrosion, being run-over, being kinked.**

SLING CARE

Proper care and usage are essential for maximum service and safety. Wire Rope Slings should be protected from sharp bends and cutting edges by means of corner saddles, burlap padding, or wood blocking. Heavy or continuous over-loading should be avoided as well as sudden jerks which can build up a momentary over-load sufficient to break the sling. Slings should be lubricated to prevent rust, and hung up when not in use.

USE OF WIRE ROPE SLINGS

SAFE OPERATING PRACTICES

Whenever any sling is used, the following practices shall be observed:

- Slings that are damaged or defective shall not be used
- Eyes in wire rope slings shall not be formed by using knots or wire rope clips
- Slings shall not be shortened with knots, bolts or other makeshift devices
- Sling legs shall not be kinked
- Slings shall not be loaded in excess of their rated capacities
- Slings used in a basket hitch shall have the loads balanced to prevent slippage
- Slings shall be securely attached to their loads
- Slings shall be padded or protected from the sharp edges of their loads
- Suspended loads shall be kept clear of all obstructions
- All employees shall be kept clear of loads about to be lifted and of suspended loads
- Hands or fingers shall be kept clear of loads about to be lifted and of suspended loads
- Shock loading is prohibited
- A sling shall not be pulled from under a load when the load is resting on the sling

Welded end attachments shall not be used unless proof tested by the manufacturer or equivalent entity at twice their rated capacity prior to initial use. The employer shall retain a certificate of the proof test, and make it available for examination. Welding of end attachments, except covers to thimbles, shall be performed prior to assembly of the sling.

SLING ANGLE

The angle formed by a sling leg and a vertical line is the most common sling angle considered in most Wire Rope Sling catalogs. As this angle increases, the rate capacity of the sling decreases. The sling angle is such a common consideration that most tables show rated capacities for two wire rope slings at 30°, 40°, and 60°. These ratings may be safely applied to other angles having these approximate values except for angles above 60°. On those angles, the rated capacity decreases so rapidly that their use should be limited to necessary applications where headroom will not permit a more favorable angle. Such applications should always be computed to insure that large enough slings are used.

CENTER OF GRAVITY

The center of gravity of an object is that point at which the entire weight may be considered as concentrated. In order to make a level lift, the crane hook must be directly above this point. While slight variations are usually permissible, if the crane hook is too far to one side of the center of gravity, dangerous tilting will result and should be corrected at once. For this reason, when the center of gravity is closer to one point of Wire Rope Sling attachment than to the other, the slings must be on unequal length. The sling stresses and sling angles will also be unequal.

RATED CAPACITY

The rated capacity of a sling varies, depending upon the type of hitch. The duty tables indicate, by illustration the applications for which the various load ratings apply, when the Wire Rope Slings are new. All ratings are in tons of 2,000 pounds. Wire rope slings shall not be used with loads in excess of those shown in appropriate Rated Capacity Tables. Slings not included in available Rated Capacity Tables shall be used only in accordance with the manufacture's recommendations.

DESIGN FACTOR

In general, a design factor of approximately five is maintained throughout most Wire Rope Sling catalogs. A design factor of 5:1 is normal for new or unused wire rope. The design factor should allow for the splice efficiency. In the case of a bridle lift, the component stresses must be determined from Wire Rope Sling catalogs or may be calculated. Choker hitches are empirically rated at 75% efficiency of the sling capacity on a straight lift. All of these factors must be considered when calculating the 5:1 design factor. However, certain wire rope fittings, such as hooks, which straighten without breaking, or links, which will deform beyond usefulness before breaking, cannot be assigned a definite numerical design factor. In such cases, suitable rated capacities are listed, based upon wide experience and sound engineering practice.

MODE OF SLING FAILURE IN STRAIGHT TENSILE PULL

Wire Rope Slings with hand-tucked splice eyes normally fail at the last strand tuck-away from crotch of the eye. Wire Rope Slings with mechanically spliced eyes normally fail at the nose of the pressed sleeve.

SPLICE EYE (approximate) EFFICIENCIES

Mechanical Spliced Eyes

IWRC Rope – ¼" through 1" diameter

95% of catalog wire rope strength

1 1/8" through 2 ½" diameter

92.5% of catalog wire rope strength

FIBRE CORE ROPE (not recommended)

¼" through 1" diameter

92.5% of catalog wire rope strength

1 1/8" through 2 ½" diameter

90.0% of catalog wire rope strength

Hand Tucked Splice Eyes

¼" diameter – 90% of catalog wire rope strength

5/16" diameter – 89% of catalog wire rope strength

3/8" diameter – 88% of catalog wire rope strength

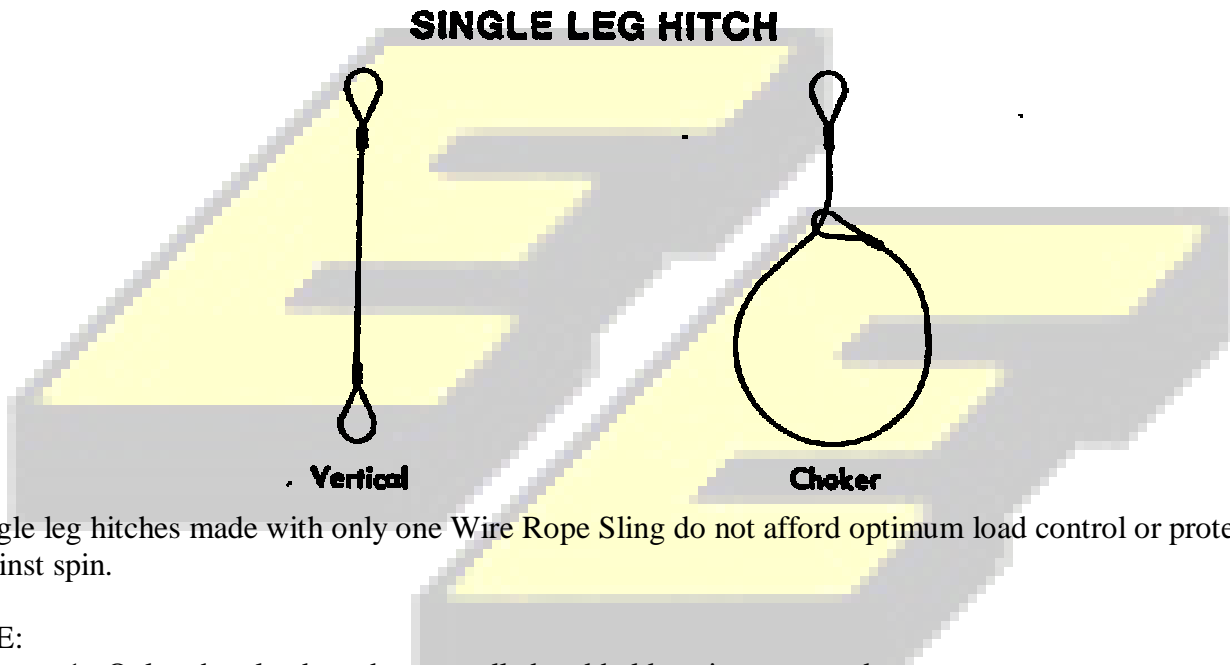
7/16" diameter – 87% of catalog wire rope strength

½" diameter – 86% of catalog wire rope strength

- 9/16" diameter – 85% of catalog wire rope strength
- 5/8" diameter – 84% of catalog wire rope strength
- 3/4" diameter – 82% of catalog wire rope strength
- 7/8" diameter – through 2 1/2" diameter – 80% of catalog wire rope strength

MAKING HITCHES WITH WIRE ROPE SLINGS

Loads vary in size, shape and weight, and in the number and location of points at which slings can be attached. Yet for every kind of load and lift point, there is a correct sling and hitch to employ. Following are shown some of the more popular types of hitches together with their respective advantages and limitations.



Single leg hitches made with only one Wire Rope Sling do not afford optimum load control or protection against spin.

USE:

1. Only when load can be controlled and held against any tendency to rotate.
2. Round and Flat Braided multipart torsionally balanced sling bodies.
3. A second Wire Rope Sling in conjunction with a beam or spreader bar.

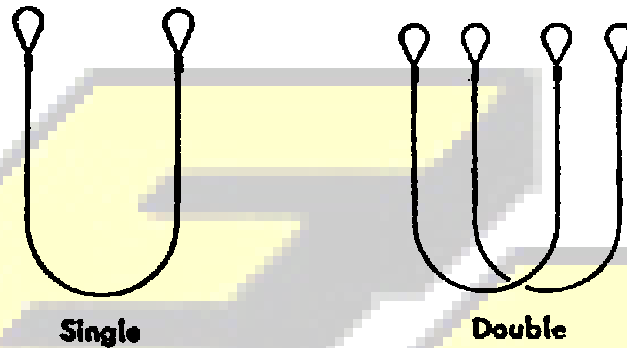
DO NOT:

1. Carry a single leg hitched load over the heads of other people.
2. Use a swivel crane hook or a swivel attachment to the load, less the continuous tendency of the single-part or cabled sling body to spin will eventually loosen the splice, unbalance the rope, and cause premature and unexpected sling failure.
3. Subject to any sudden starts and stops.

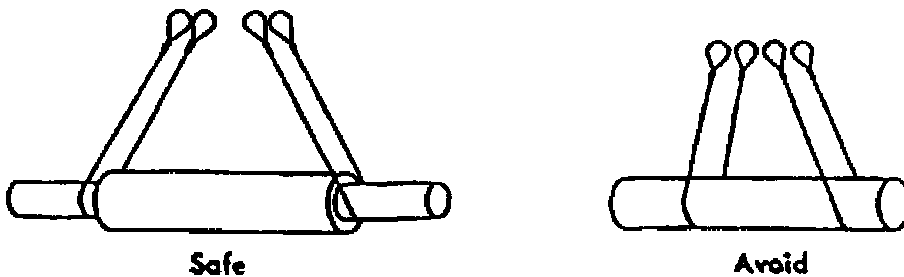
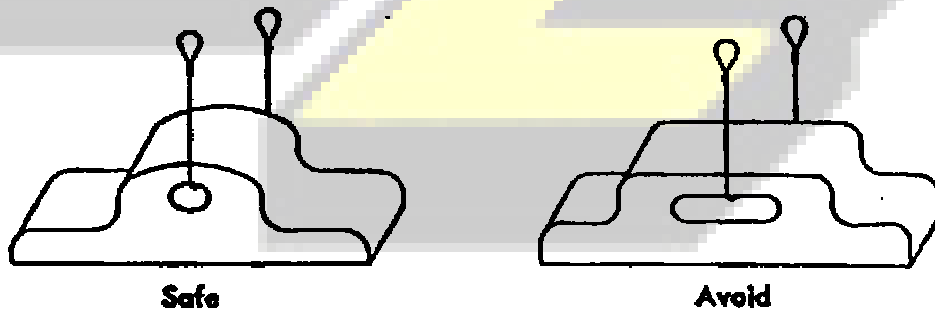
BASKET HITCH

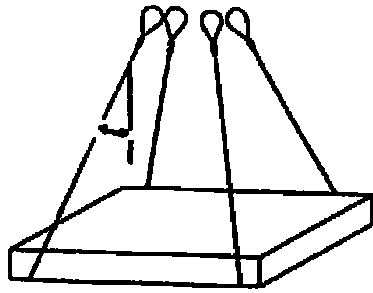
The rated load of a Wire Rope Sling used for a basket hitch would be down graded in proportion to the diameter of bend at the bottom of the hitch. The percent of down grading is obtained from the curve shown. If the sling has spliced eyes the degree of down grading is minimized based on the efficiency of the splice employed. Thus, if a tucked splice efficiency is 90% and the D/d ration at bottom of hitch is 16 (see curve), no down grading would be necessary.

BASKET HITCH

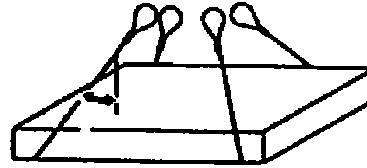


Basket hitches are widely used and are excellent on many types of lifts. They are easy to attach and, when properly applied, provide good load control. Even when only one sling is used, the stress on each leg of the sling is automatically equalized.





**30° & Under
Safe**

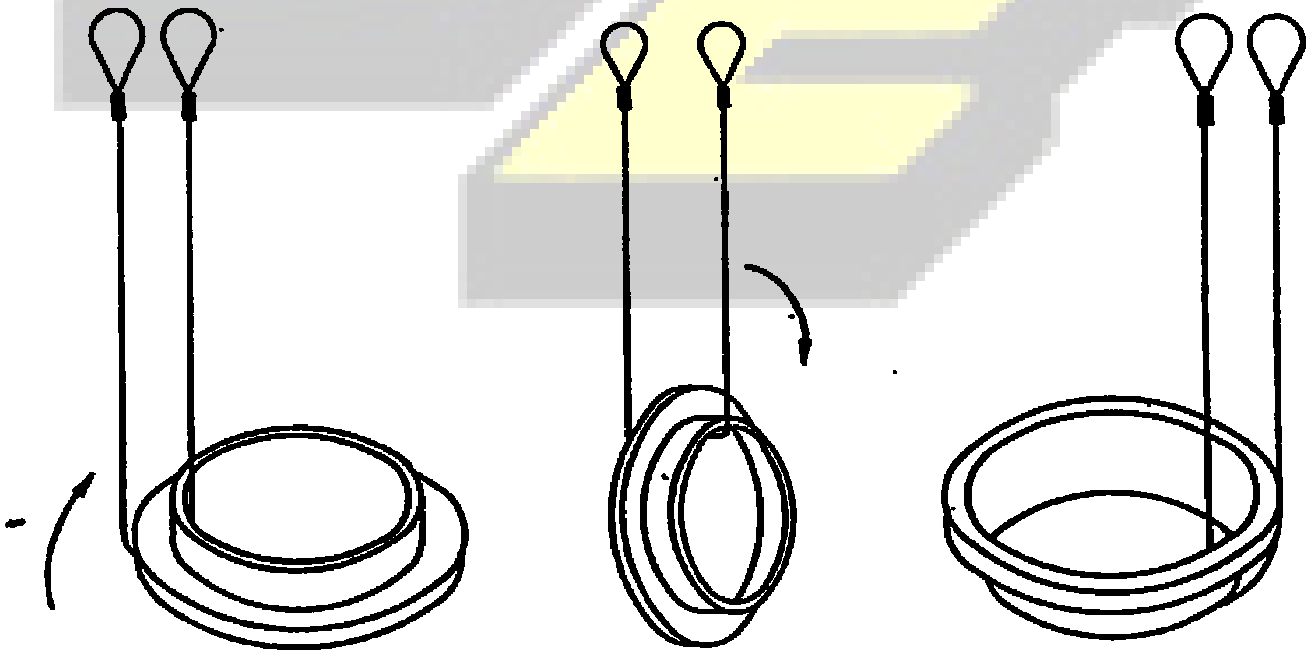


**More Than 45°
Avoid**

USE: On straight lifts which are of such shape that sliding of the Wire Rope Sling over the surface of the load will not be lost.

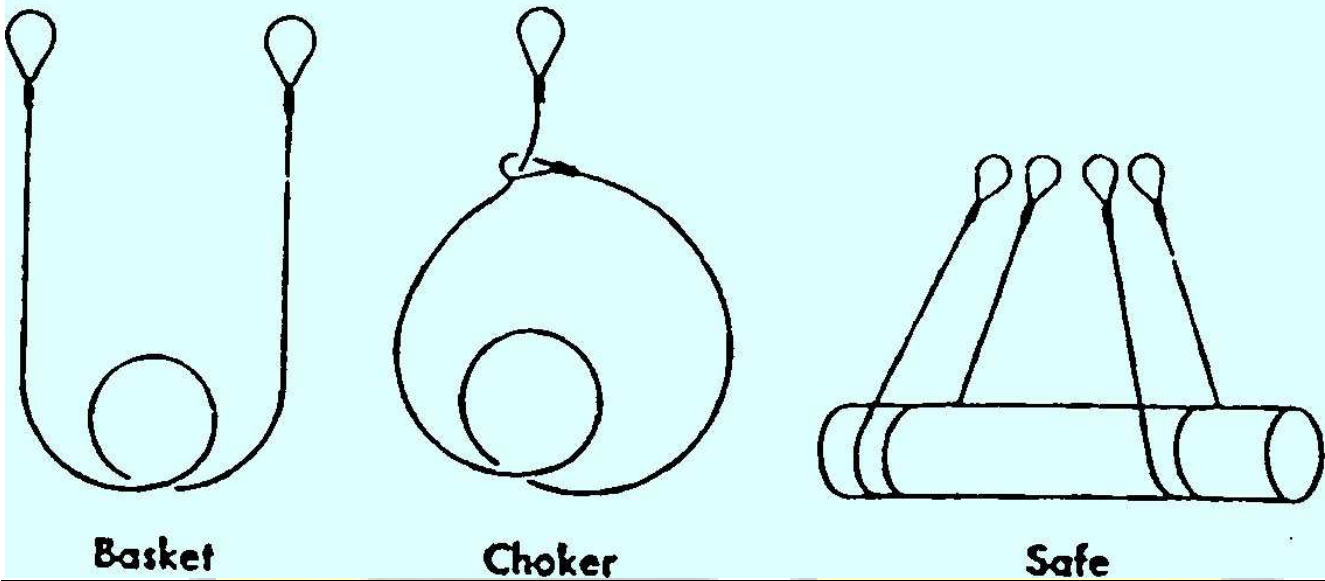
DO NOT USE:

1. Lift smooth cylindrical objects with Wire Rope Sling legs at angles unless there is a shoulder.
2. Lift rectangular objects when the angle between a vertical line and sling leg is more than 45°.
3. Turn loads while in the basket hitch. This causes scuffing and abrasive wear and damage to both the sling and the load.



Avoid turning load in basket hitch.

DOUBLE WRAP HITCH



DOUBLE WRAP HITCH

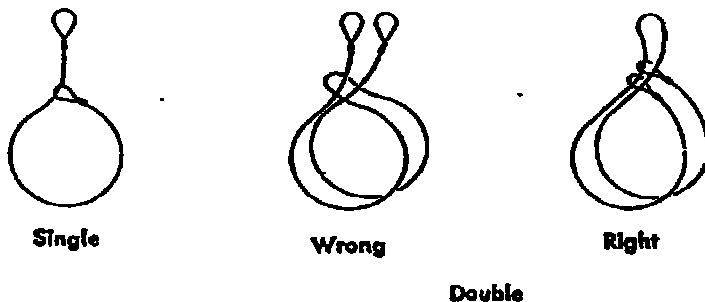
A double wrap hitch gives 360° contact with the load. Pressure is exerted all around the load and there is no danger of losing the load.

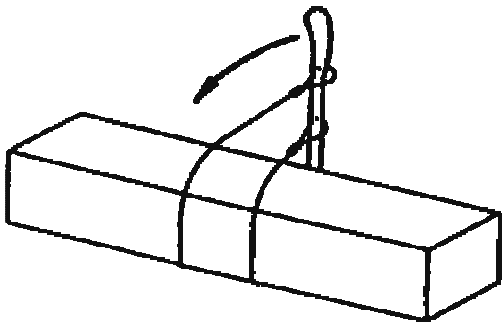
USE: For handling bundles of bars and pipes or for smooth cylindrical loads with no shoulder.

CHOKER HITCH

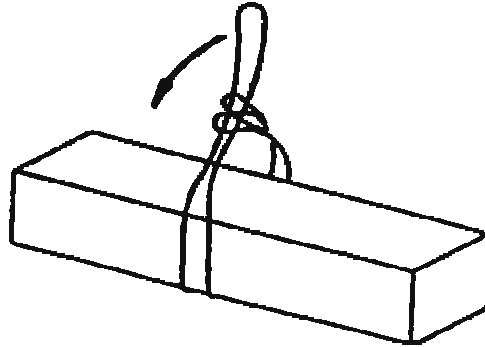
Choker hitches are easy to attach any by their snubbing action to give a good degree of load control. When loads are to be turned, a choker hitch, especially a double choker hitch, is the hitch to employ. A properly made choker hitch will always tend to tighten up as the load is lifted. A properly made double choker hitch, will “choke” through the eyes with the sling center bearing on the crane hook. In this way, the two legs of the Wire Rope Sling are automatically equalized as a load is lifted. When a double choke hitch is made incorrectly, there is no automatic stress equalization and it is possible for one leg to take all the load. For optimum sling life, choker hook or shackle is recommended for use at the point of “choke”. A double choker hitch is twice as strong as a single choker hitch, all other factors remaining constant.

CHOKER HITCH





Right



Wrong

DIRECTION OF TURN

USE:

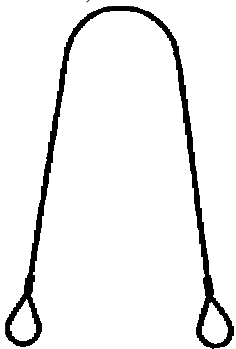
1. For handling bundles of bars and pipes.
2. For turning loads (use double choker hitch, if possible).

DO NOT:

1. “Choke” in a way that will loosen the hitch.
2. Use incorrect method of double choker hitch.
3. Turn load so eye or eyes at “choke” fact the direction of turn.

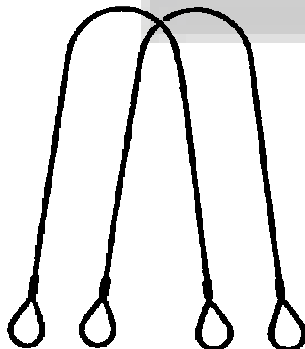
REVERSE BASKET HITCH AND SINGLE LENGTH DOUBLE BASKET HITCH

In these hitches the bight of the sling bears on the crane hook. In this way, the Wire Rope Sling is free to move through the hook according to the weight distribution and automatic equalization takes place. For this reason, these hitches must be used with caution.

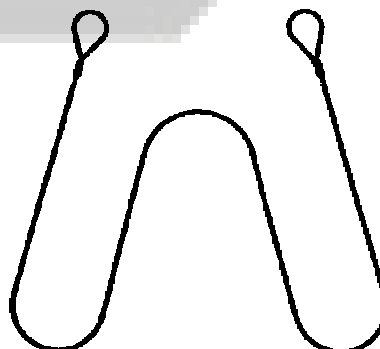


2 legs

Reverse Basket Hitch

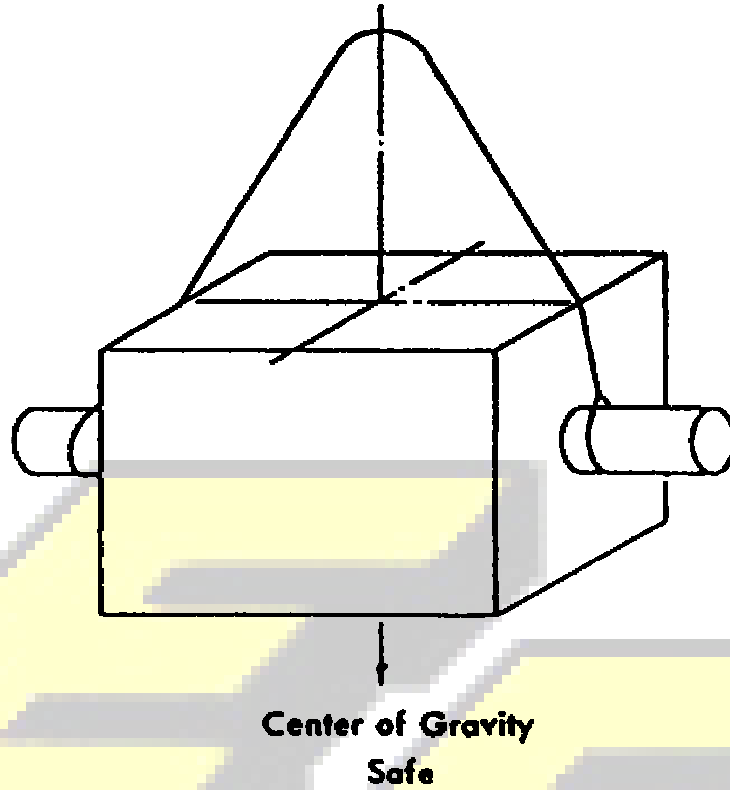


4 legs



Single Length

Double Basket Hitch

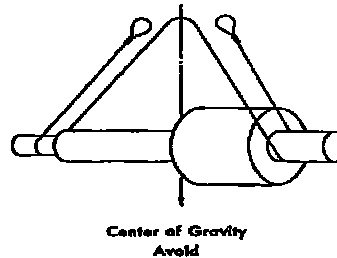
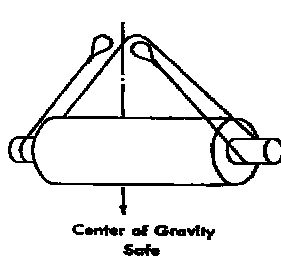
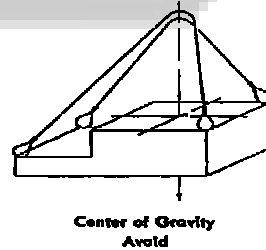
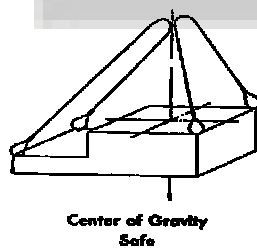


USE:

1. To lift loads having lifting lugs or trunnions.
2. To lift loads of reasonable symmetry.

DO NOT:

1. Lift unsymmetrical loads having their center of gravity significantly closer to one end than the other.



ADJUSTING HITCH

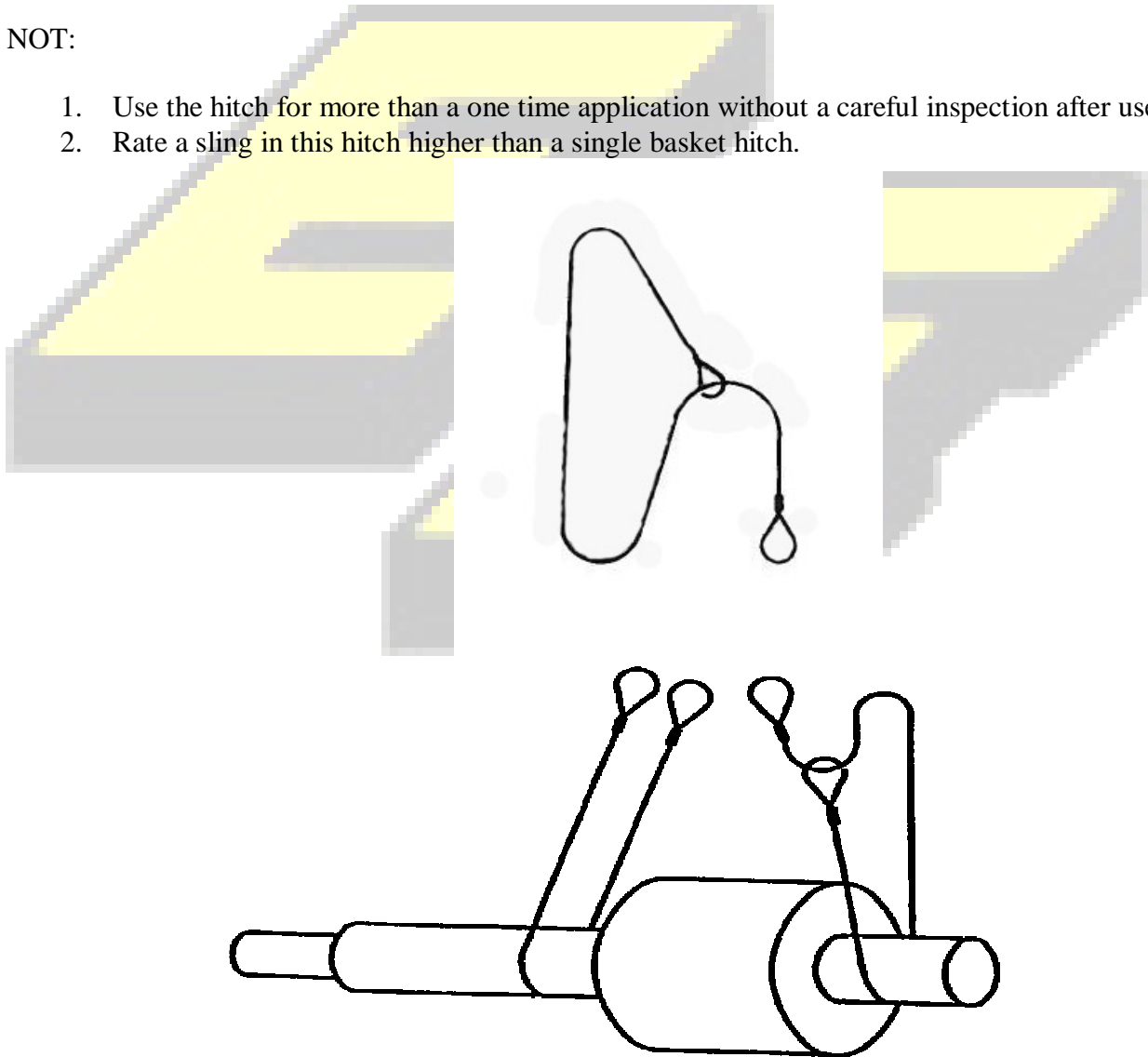
This is very useful hitch, especially when a load of unequal load distribution is to be lifted. To lift such a load level and under control requires a shorter Wire Rope Sling on the heavy end. The adjusting hitch will adjust itself to the required shortened length but will not slip after equalization is reached. One word of caution, in this hitch, the sling is forced to bend around its own diameter. This can cause a permanent kink and serious damage to the sling.

USE:

1. For lifting loads of unequal weight distribution where, in order to obtain proper load control, it is necessary to shorten one sling.

DO NOT:

1. Use the hitch for more than a one time application without a careful inspection after use.
2. Rate a sling in this hitch higher than a single basket hitch.



Safe

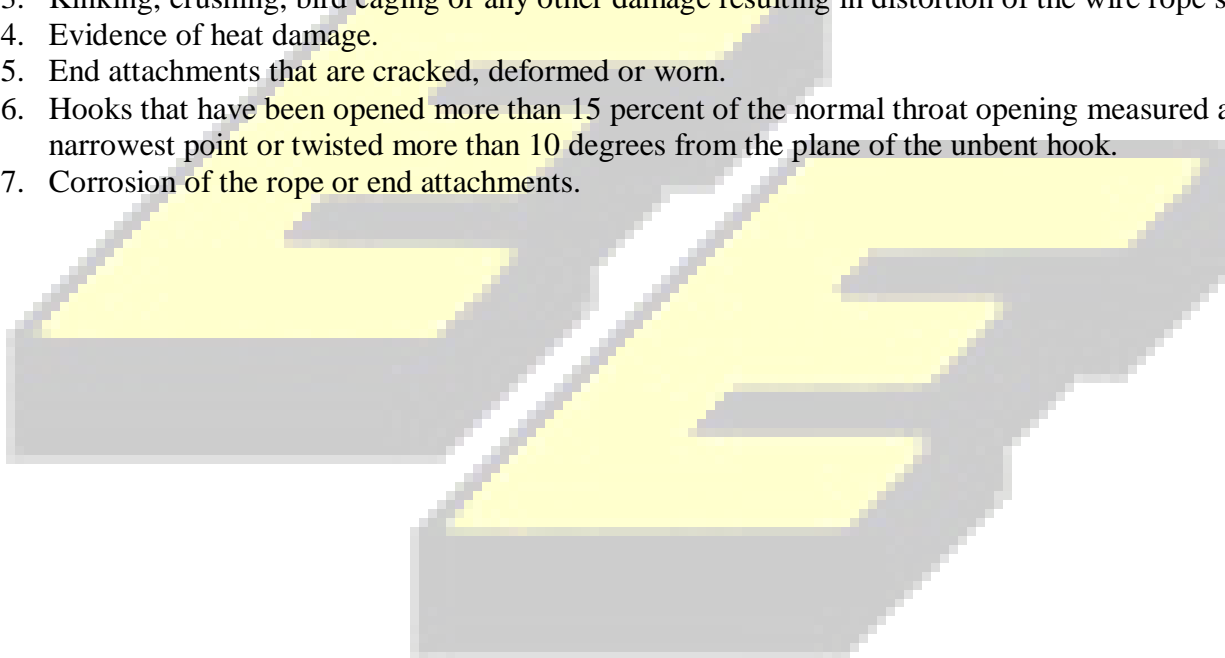
INSPECTION OF WIRE ROPE SLINGS

Each day before being used, the sling and all fastenings and attachments shall be inspected for damage or defects by a competent person designated by the employer. Additional inspections shall be performed during sling use, where service conditions warrant. Damaged or defective slings shall be immediately removed from service.

REPLACEMENT OF WIRE ROPE SLINGS

Wire Rope Slings shall be immediately removed from service if any of the following conditions are present:

1. Ten randomly distributed broken wires in one rope lay, or five broken wires in one strand in one rope lay.
2. Wear or scraping of one-third the original diameter of outside individual wires.
3. Kinking, crushing, bird caging or any other damage resulting in distortion of the wire rope structure.
4. Evidence of heat damage.
5. End attachments that are cracked, deformed or worn.
6. Hooks that have been opened more than 15 percent of the normal throat opening measured at the narrowest point or twisted more than 10 degrees from the plane of the unbent hook.
7. Corrosion of the rope or end attachments.



**LOAD CHART of Sling Stresses
at Various Sling Angles**

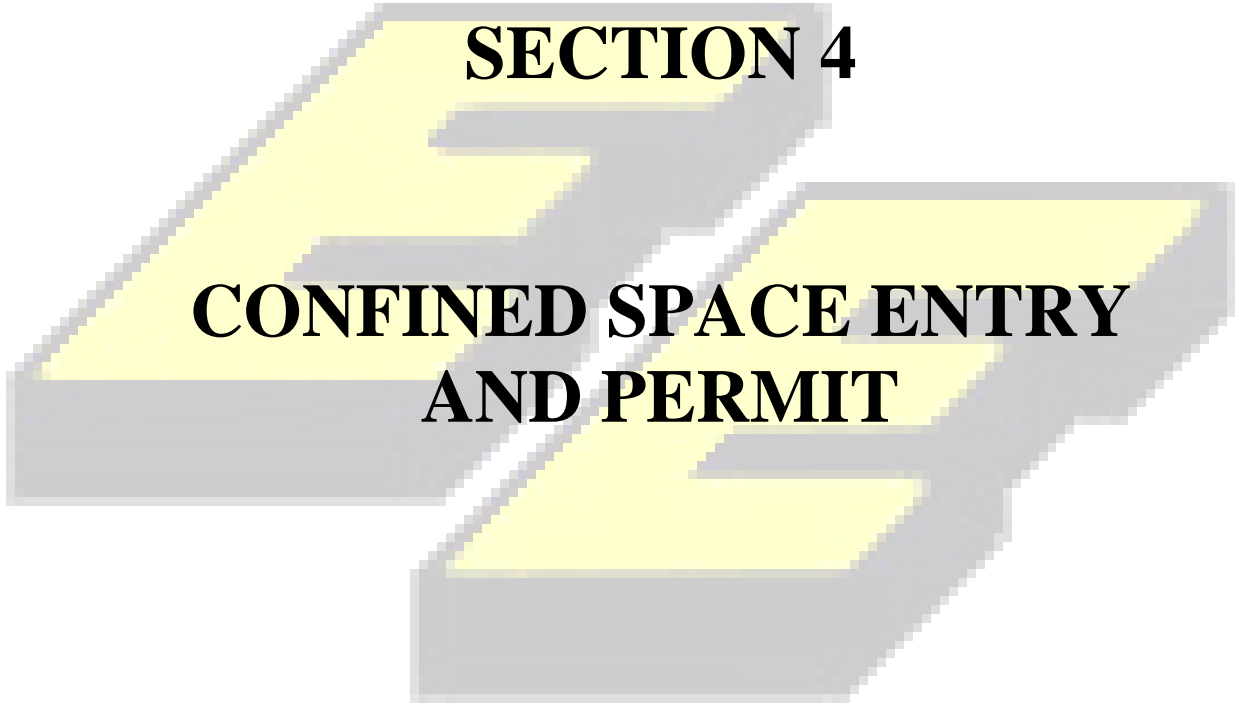
| LOAD CHART of Sling Stresses at Various Sling Angles | | | | VERTICAL LOAD ON ONE LEG | INCREASE IN STRESS DUE TO SLING ANGLE | TOTAL SLING STRESS | AN GLE |
|---|--------------------------------|--|--------------------------|--------------------------------|--|--------------------------|-----------|
| | | | | | | | 90° |
| | | | | 1000 lbs. | 1,047. % | 11473 lbs. | 85° |
| | | | | 1000 lbs. | 476. % | 5759 lbs. | 80° |
| | | | | 1000 lbs. | 286. % | 3863 lbs. | 75° |
| | | | | 1000 lbs. | 192. % | 2924 lbs. | 70° |
| | | | | 1000 lbs. | 136. % | 2366 lbs. | 65° |
| | | | | 1000 lbs. | 100. % | 2000 lbs. | 60° |
| | | | | 1000 lbs. | 74.3% | 1743 lbs. | 55° |
| | | | | 1000 lbs. | 55.5% | 1555 lbs. | 50° |
| | | | | 1000 lbs. | 41.4% | 1414 lbs. | 45° |
| ANGLE | VERTICAL LOAD ON ONE LEG | INCREASE IN STRESS DUE TO SLING ANGLE | TOTAL SLING STRESS | | | | |
| 0° | 1000 lbs. | 0 % | 1000 lbs. | | | | |
| 5° | 1000 lbs. | 0.3% | 1003 lbs. | | | | |
| 10° | 1000 lbs. | 1.5% | 1015 lbs. | | | | |
| 15° | 1000 lbs. | 3.5% | 1035 lbs. | | | | |
| 20° | 1000 lbs. | 6.4% | 1064 lbs. | | | | |
| 25° | 1000 lbs. | 10.3% | 1103 lbs. | | | | |
| 30° | 1000 lbs. | 15.4% | 1154 lbs. | | | | |
| 35° | 1000 lbs. | 22.0% | 1220 lbs. | | | | |
| 40° | 1000 lbs. | 30.5% | 1305 lbs. | | | | |
| 45° | 1000 lbs. | 41.4% | 1414 lbs. | | | | |

EXAMPLE

This chart illustrates how the stress in a sling varies with the sling angle.

For example, when one sling leg lifts 1,000 pounds at 0°, the sling stress is also 1,000 pounds. If the sling angle is changed to 45°, the sling stress would be 1,414 pounds, or an increase of 41.4%. If further changed to 60°, the stress would be 2,000 pounds, or a 100% increase. This illustrates the importance of sling angles when selecting slings and why the rated capacity of a sling decreases as the angle decreases.





SECTION 4
**CONFINED SPACE ENTRY
AND PERMIT**

CONFINED SPACE ENTRY

TABLE OF CONTENTS

- I. Purpose
- II. Scope
- III. Definition
- IV. Permit Required Confined Space
 - A. Requirements for written Entry Permits
 - 1. Employee Instructions
 - 2. Environmental Testing
 - 3. Personal Protective Equipment
 - 4. Ventilation/Exhaust
 - 5. Lighting Electrical
 - 6. Communications
 - 7. Fire Protection
- V. Lockout Procedure
- VI. Record Keeping Requirements
- VII. Rescue
- VIII. Non Permit Required Confined Space
- IX. Confined Space Entry Permit

CONFINED SPACE ENTRY

I. PURPOSE

- A. The purpose of this section is to ensure the entry, subsequent work operations and exit from within confined spaces are accomplished in a manner where safety, health and fire protection are maintained at all times.

II. SCOPE

- A. It is often necessary to perform many types of work operations in confined spaces. Such as various types of vessels, tanks or other enclosed environments.

III. DEFINITION

- A. Confined space is defined as any space having a limited means of egress and that is not designed for continuous accumulation of toxic or flammable contaminants or has an oxygen deficient atmosphere. Confined or enclosed spaces include, but are not limited to, storage tanks, process vessels, bins, boilers, ventilation or exhaust ducts, sewers, underground utility vaults, pipelines and open top spaces more than four feet in depth such as pits, tubs, vaults, caissons, trenches and vessels.

I. PERMIT REQUIRED CONFINED SPACE

A. Requirements for Written Entry Permits

- 1. All employees required to enter confined spaces shall be instructed as to:
 - a. The nature of the hazards involved
 - 1. Atmosphere
 - 2. Engulfment
 - 3. Space or physical means

B. The necessary precautions that must be taken:

- 1. Specify special entry conditions.
- 2. How to isolate the permit space.
- 3. Purge, flush and/or ventilate.
- 4. The use of barriers to prevent unauthorized persons from entering.

C. The use of personal protective and emergency rescue services providers.

D. Specify training for the following:

1. Authorized entrant
2. Attendant duties
3. Entry supervision
4. Rescue and emergency service

In addition to the foregoing listed requirements, the employer shall comply with any specific regulations that apply to work in dangerous or potentially dangerous areas.

1. Environmental Testing

- a. Before entry into any confined or enclosed space suspected of having mixtures or concentrations of flammable and/or toxic air contaminants or an oxygen deficiency, appropriate tests of the atmosphere shall be made by the Entry Supervisor or other qualified person to assure that explosive or toxic limits are not exceeded, or that the oxygen concentration is not below 19.5% of the total air mixture.
- b. Any confined or enclosed space found to have or suspected of having oxygen deficiency or exceeding toxic or flammable limits shall be:

1. Promptly reported to the Safety Representative
2. Posted with appropriate warning signs (i.e. KEEP OUT, FLAMMABLE, TOXIC, INERT, etc.)
3. Ventilated or exhausted, as required by site conditions
4. Rechecked by approved methods prior to entry (see paragraph IV. A. 2. a).
 - a. During inert gas welding, portable and /or fixed oxygen analyzers with visual/ audible alarms shall be provided in areas where an oxygen deficient atmosphere may occur.
 - b. All monitoring and air sampling equipment shall be maintained and calibrated in accordance with the manufacturer's specifications. Safety Department in Leesburg, Florida shall maintain records of all calibrations.

Note: Many vessels, transformers, etc., are received with an inert gas purge. The Entry Supervisor must ensure a safe atmosphere prior to entry for inspection or rework.

2. Personal Protective Equipment

- a. Suitable work/rescue equipment, including lifelines, belts, stretchers, mobile cranes or hoists, etc., shall be available at all times. Protective equipment shall be selected for the anticipated potential hazards or possible contingencies during the work operations.
- b. Appropriate eye, face and ear protection as well as protective clothing must be worn by employees who are exposed to physical hazards.
- c. Where air sampling has determined that flammable or toxic limits have been exceeded or an oxygen deficiency exists and accepted engineering control measures such as general and local ventilation are not feasible, respiratory protection (cartridge masks, air line respirators, etc.) which are suitable for the identified air contaminants must be worn.

4. Ventilation / Exhaust

- a. When ventilation is used as the air engineering control method in maintaining acceptable concentrations of flammable and toxic contaminants (such as dust, fumes, mists, vapors, and gasses), this section will be used as a guide in the installation and operation of ventilation systems.
 1. Ventilation /exhaust will be designed, constructed, maintained and operated as maintaining a volume and velocity of exhaust air sufficient to gather dusts, fumes, vapors or gasses from the confined or enclosed space and to convey them to suitable points for safe disposal thereby preventing their dispersion in harmful concentrations into other atmospheres where employees are or will be working during ventilation operations.
 2. Periodic air sampling for flammable and toxic materials and oxygen deficiencies shall be performed before, during, and after employee work assignments in the confined or enclosed space to ensure toxic limits are not exceeded and a safe environment is maintained. The Entry Supervisor is responsible for making appropriate tests and advising the authorized entry personnel when the breathing air meets requirements.

5. Lighting/Electrical

- a. Lighting will be provided in areas where sufficient natural light does not meet requirements. All lighting and electrical power will be connected to a GFCI protection device located outside the confined space.

- b. For work areas that may contain concentrations of flammable materials that exceed explosive limits, appropriate lighting systems such as explosion proof fixtures, switches or equipment otherwise designated for explosive atmospheres shall be used. See Article 500 of the National Electric Code. (Hazardous (Classified) Locations).
- c. Emergency lighting shall be provided at all points of access and egress. In areas where installation of emergency lighting is not practical, explosion proof flashlights shall be provided to persons required to enter confined or enclosed spaces, which, are subject to blackout.
- d. In areas where moisture exists, portable electric lighting shall be operated at maximum of 12 VDC.

6. Communications

- a. Communications shall be maintained with all personnel in enclosed or confined spaces by personnel outside those areas. This shall be accomplished by utilizing one or more of the following methods:
 - 1. Visual
 - 2. Voice
 - 3. Telephone
 - 4. Two-way radio (explosion proof when required)

Note: Selection shall be dictated by the presence of an explosive atmosphere in areas intended use.

7. Fire Protection

- a. Fire protection shall be provided in confined or enclosed spaces at all times.
 - 1. Access and egress will be maintained at all times where work is being performed in a confined or enclosed space. Access ladders, floors and components that are constructed of combustible materials shall be protected, covered or wrapped with a flame retardant material.
 - 2. Flammable liquids (i.e. acetone, alcohol, etc.) must be stored in approved (UL or FM) flammable liquid containers or dispensers. The amount of such flammable liquids shall not be in excess of the amount necessary to perform the work each day.
 - 3. Properly rated fire extinguishers must be immediately available. In instances where extreme fire potential exists, a charged fire hose must be available for immediate use.

4. Cylinders containing oxygen, acetylene or other fuel gasses must not be taken into confined or enclosed spaces.
5. All rags, brushes, wipes, gloves, etc. must be stored in metal containers with lids.
6. A person must be posted during all welding, burning and heating operations to monitor for fires and shall ensure that after the work has ceased or at the end of a work shift, that there are no fire conditions present.
7. All flammable gas equipment, hoses, torches, etc. must be free of defects and be inspected by the user prior to such operations and shall be adequately protected to prevent ignition.
8. To eliminate possible fire in enclosed spaces as a result of gas escaping through leaking or improperly closed torch valves, the gas supply to the torch must be positively shut whenever the space is left unattended, such as during lunch breaks.
9. At the end of a work shift, the torch and hose shall be removed from the confined or enclosed space. Open-end fuel gas and oxygen hoses shall be immediately removed from enclosed spaces when they are disconnected from the torch or other gas-consuming device.

V. Lockout Procedures

- A. All lines, pipes, electrical disconnects, or other conveyance of flammable and/or toxic materials shall be positively locked out and tagged in accordance with the Lockout/Tag out section of this manual.

VI. Record Keeping Requirements

- A. A special work authorization, such as a confined space entry permit, hot work or welding/ cutting permit shall be prepared and signed by the person in charge of the work operation. It will be then reviewed by the responsible supervisor after visual inspection has been completed and all requirements of this section have been met.

The confined space entry permit at the end of this section provides guidelines for safe entry. Each item must be addressed whether applicable or not.

- B. A log sampling results shall be kept by the Entry Supervisor for each confined space entry.
- C. Employee training records shall be maintained by the Safety Department in Leesburg, Florida.

D. The Corporate Safety Director shall be informed of all work involving confined space entries. A file of permits issued shall be maintained in the Corporate Safety Office, and the job file.

VII. Rescue

Whenever work is to be performed in a confined space, emergency rescue must be anticipated. The Entry Supervisor will be responsible for training his/her employees in emergency procedures (i.e. rescue, escape, etc.) or how to obtain additional emergency help.

VIII. Non Permit Required Confined Space

A. Is a space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

1. All requirements of a permit required confined space apply except for the requirement for respirator protection.
2. May not require the use of an attendant to be stationed outside the space.

CONFINED SPACE ENTRY PERMIT

1. Job Name _____
2. Job Number _____
3. Location _____
4. Permit Space to be Entered _____
5. Purpose of Entry _____
6. Date of Entry _____ Authorized Duration of Entry Permit _____
7. Authorized Entrants _____

8. Attendants: _____
9. Name of Current Entry Supervisors _____ Time _____
 _____ Time _____

Entry Supervisor who Originally Authorized Entry (signature) _____

| 10. Record hazards of the permit space to be entered. | | | | |
|---|-----|----|-----|--|
| Hazard | Yes | No | N/A | Check or list the measures used to isolate the permit space and to eliminate or control permit space hazards before entry. |
| A. Lack of Oxygen | | | | <input type="checkbox"/> A. Purge, Flush and Vent |
| B. Combustible Gases | | | | |
| C. Combustible Vapors | | | | <input type="checkbox"/> B. Ventilation |
| D. Combustible Dusts | | | | |

| Hazard | Yes | No | N/A | |
|---------------------|-----|----|-----|--|
| Toxic Gasses | | | | <input type="checkbox"/> Lockout / Tag Out |
| Toxic Vapors | | | | |
| Chemical Contact | | | | <input type="checkbox"/> Inerting |
| Electrical Hazards | | | | |
| Mechanical Exposure | | | | <input type="checkbox"/> Blanking, Double Blind And Bleed |
| Temperature | | | | |
| Engulfment | | | | <input type="checkbox"/> External Barricades |
| Entrapment | | | | |
| Others | | | | <input type="checkbox"/> Confined Space Identification / Signs |

11. Acceptable Entry Conditions

| Tests to be taken | √ | Permissible entry levels | Test 1 | Test 2 | Test 3 | Test 4 |
|----------------------------|---|--------------------------|--------|--------|--------|--------|
| Percent of Oxygen | | 19.5% to 23.5% | | | | |
| Carbon (CO) Monoxide | | 50 PPM or Less | | | | |
| Hydrogen (H2S) Sulfide | | 10 PPM or Less | | | | |
| Flammable Limits | | 10% LFL or Less | | | | |
| Chlorine (CL2) | | .5 PPM or Less | | | | |
| Chlorine (CL2) Dioxide | | .1 PPM or Less | | | | |
| Sulfur Dioxide | | 2 PPM or less | | | | |
| | | | | | | |
| | | | | | | |
| Name or Initials of Tester | | | | | | |
| Test Times | | | | | | |

12. Rescue and emergency services available:

Name _____ Name _____

Telephone _____ Telephone _____

13. Communication procedures to be used by authorized entrants and attendants.
 Voice _____ Radio _____ Visual _____

14. Equipment supplied to the employee

| Yes | No | N/A | Equipment | Description |
|-----|----|-----|--|---|
| | | | Gas Test and Name _____ Monitoring Serial/ Unit No. | Model/Type _____ |
| | | | Ventilating | |
| | | | Communications | |
| | | | Personal Protective Equipment | <input type="checkbox"/> Safety Harness <input type="checkbox"/> With Life Lines <input type="checkbox"/> Respiratory <input type="checkbox"/> Hard Hats <input type="checkbox"/> Eye <input type="checkbox"/> Ear <input type="checkbox"/> Face <input type="checkbox"/> Hand <input type="checkbox"/> Foot <input type="checkbox"/> Clothing |
| | | | Lighting | GFCI/12 Volt/ Explosion Proof? |
| | | | Barriers/ Shields | <input type="checkbox"/> Pedestrian <input type="checkbox"/> Vehicle <input type="checkbox"/> Other |
| | | | Safe Ingress/ Egress | <input type="checkbox"/> Ladders |
| | | | Rescue and Emergency | <input type="checkbox"/> Lifelines <input type="checkbox"/> Hoists <input type="checkbox"/> Resuscitators / Inhalator |
| | | | Other Safety Equipment | |

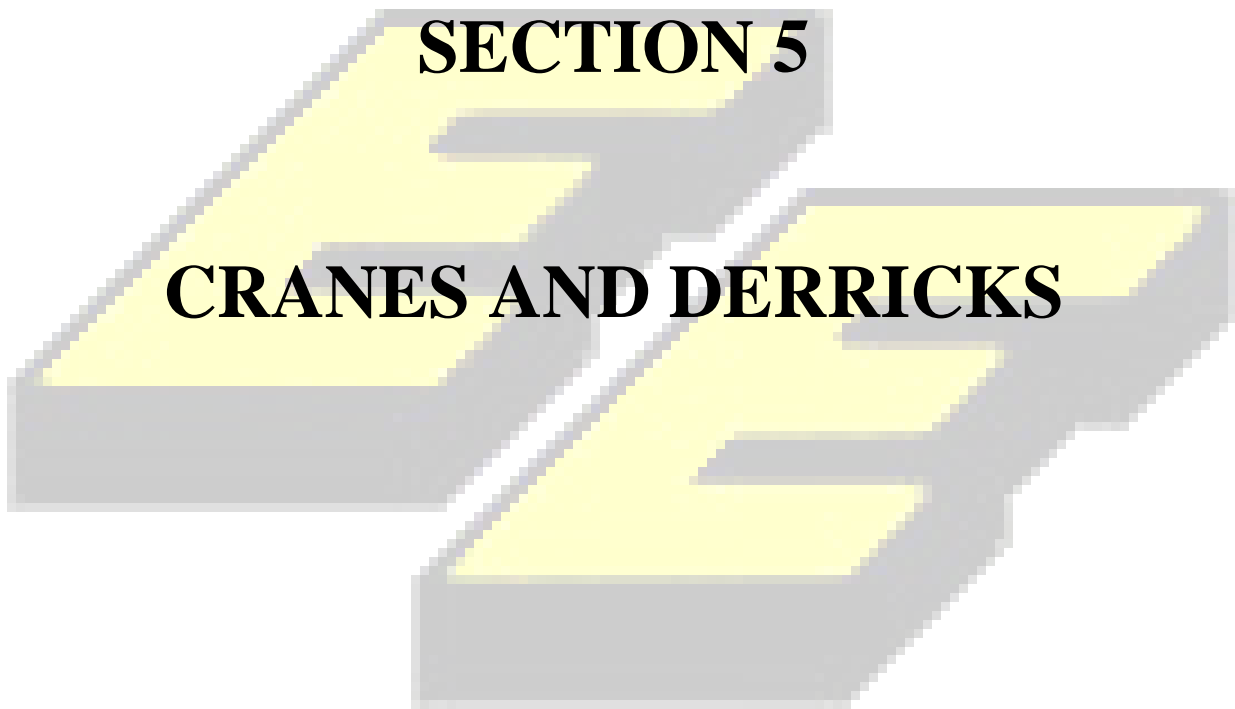
15. Other information for this particular confined space to ensure employee safety.

16. Additional Permits Required Hot Work Other

This confined space entry permit has been cancelled:

By: _____ AM/ PM _____
 Entry Permit Supervisor Time Date

Job Safety File- Original
 Cc: Jobsite Safety Department



SECTION 5
CRANES AND DERRICKS

CRANES AND DERRICKS

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CRANES AND DERRICKS

I. PURPOSE

To protect the health and welfare of all ENERGY ERECTORS, INC. employees from safety hazards associated with the operation of cranes and derricks. This section is intended to help employees comply with subpart N 29CFR1926.

II. SCOPE

This procedure applies to all employees working for ENERGY ERECTORS, INC. that operate or work around cranes and derricks.

III. CRANES AND DERRICKS

A. General requirements

1. The employer shall comply with the manufacturer's specifications and limitations applicable to the operation of any and all cranes and derricks. Where manufacturer's specifications are not available, the limitations assigned to the equipment shall be based on the determinations of the qualified engineer competent in this field and such determinations will be appropriately documented and recorded. Attachments used with cranes shall not exceed the capacity, rating or scope recommended by the manufacturer.
2. Rated load capacities, and recommended operating speeds, special hazard warnings, or instruction, shall be conspicuously posted on all equipment. Instructions or warnings shall be visible to the operator while he is at his control station.
3. Hand signals to crane and derrick operators shall be those prescribed by the applicable ANSI standard for the type of crane in use. An illustration of the signals shall be posted at the job site. (See sample at the back of this section).
4. The employer shall designate a competent person who shall inspect all machinery and equipment prior to each use, and during use, to make sure it is in safe operating condition. Any deficiencies shall be repaired, or defective parts replaced, before continued use.
5. A thorough, annual inspection of the hoisting machinery shall be made by a competent person, or by a government or private agency recognized by the U.S. Department of Labor. The employer shall maintain a record of the dates and results of inspections for each hoisting machine and piece of equipment.

6. Wire rope shall be taken out of service when any of the following conditions exist:
 - A. In running ropes, six randomly distributed broken wires in one lay or three broken wires in one strand lay;
 - B. Wear of one-third the original diameter of outside individual wires. Kinking, crushing, bird caging, or any other damage resulting in distortion of the rope structure;
 - C. Evidence of any heat damage from any cause;
 - D. Reductions from nominal diameter of more than one-sixty-fourth inch for diameters three-eighths inch to and including five-sixteenths inch, one-thirty-second inch for diameters three-eighths inch to and including one-half inch, three-sixty-fourths inch for diameters nine-sixteenths inch to and including three-fourths inch, nine-sixteenth inch for diameters seven-eighths inch to 1 1/8 inches inclusive, three-thirty-seconds inch for diameters 1 1/4 to 1 1/2 inches inclusive;
 - E. In standing ropes, more than two broken wires in one lay in sections beyond end connections or more than one broken wire at an end connection.
 - F. Wire rope safety factors shall be in accordance with American National Standards Institute B 30.5-1968 of ASE J959-1966.
7. Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating, or other moving parts or equipment shall be guarded if such parts are exposed to contact by employees, or otherwise create a hazard.

Guarding shall meet the requirements of the American National Standards Institute d 15.1-1958 Rev., Safety Code for Mechanical Power Transmission Apparatus.

8. Accessible areas within the swing radius of the rear of the rotating superstructure of the crane, either permanently or temporarily mounted, shall be barricaded in such a manner as to prevent an employee from being struck or crushed by the crane.
9. All exhaust pipes shall be guarded or insulated in areas where contact by employees is possible in the performance of normal duties.

10. Whenever internal combustion engine powered equipment exhausts in enclosed spaces, tests shall be made and recorded to see that employees are not exposed to unsafe concentrations of toxic gases or oxygen deficient atmospheres.
11. All windows in cabs shall be safety glass or equivalent, which introduces no visible distortion that will interfere with the safe operation of the machine.
12. Where necessary for rigging or service requirements, a ladder, or steps shall be provided to give access to a cab roof.
 - a. Guardrails, handholds, and steps shall be provided on cranes for easy access to the car and cab, conforming to American National Standards Institute B30.5.
 - b. Platforms and walkways shall have anti-skid surfaces.
13. Fuel tank filler pipe shall be located in such a position, or protected in such manner, as to not allow spill or overflow to run into the engine, exhaust or electrical equipment of any machine being fueled.
 - a. An accessible fire extinguisher of 5BC rating, or higher, shall be available at all operator stations or cabs of equipment.
 - b. All fuels shall be transported, stored, and handled to meet the rules of Subpart F of this part. When fuel is transported by vehicles on public highways, Department of Transportation rules contained in 49 CFR Parts 177 and 393 concerning such vehicular transportation are considered applicable.

IV. ELECTRICAL SAFETY

A. General Requirements

1. Except where electrical distribution and transmission lines have been de-energized and are visibly grounded at the point of work or where insulation barriers which are not a part of or an attachment to the equipment or machinery have been erected to prevent physical contact with the lines, equipment or machines shall be operated proximate to power lines only in accordance with the following:
 - a. For lines rated 50kV or below, minimum clearance between the lines and any part of the crane or load shall be 10 feet;
 - b. For lines rated over 50kV, minimum clearance between the lines and any part of the crane or load shall be 10 feet plus 0.4 inch for each 1 kV

over 50 kV or twice the length of the line insulator but never less than 10 feet;

- c. In transit with no load and boom lowered, the equipment clearance shall be a minimum of 4 feet for voltages less than 50kV, 10 feet for voltages over 50 kV up to and including 345 kV and 16 feet for voltages over 345 kV up to and including 750kV;
- d. A person shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means;
- e. Cage-type boom guards, insulating links or proximity warning devices may be used on cranes, but the use of such devices shall not alter the requirements of any other regulation even if such device is required by law or regulation;
- f. Any overhead wire shall be considered to be an energized line unless and until the person owning such line or the electrical utility authorities indicate that it is not an energized line and has been visibly grounded;

2. Prior to work near transmitter towers where an electrical charge can be induced in the equipment or materials being handled, the transmitter shall be de-energized or tests shall be made to determine if electrical charge is induced on the crane. The following precaution shall be taken when necessary to dissipate induced voltages.

- a. The equipment shall be provided electrical ground directly to the upper rotating structure supporting the boom.
- b. Ground jumper cables shall be attached to materials being handled by boom equipment when electrical charge is induced while working near energized transmitters. Crews shall be provided with nonconductive poles having large alligator clips or other similar protection to attach the ground cable to the lead.

V. CRANE PERSONNEL PLATFORM

- A. At no time will ENERGY ERECTORS, INC. employees be allowed to ride or work from a crane or derrick suspended platform.

VI. ADDITION INFORMATION

- A. Specific information on cranes and derricks not commonly used by out trade can be found in subpart N of the 29CFR1926 Construction Safety Standards.

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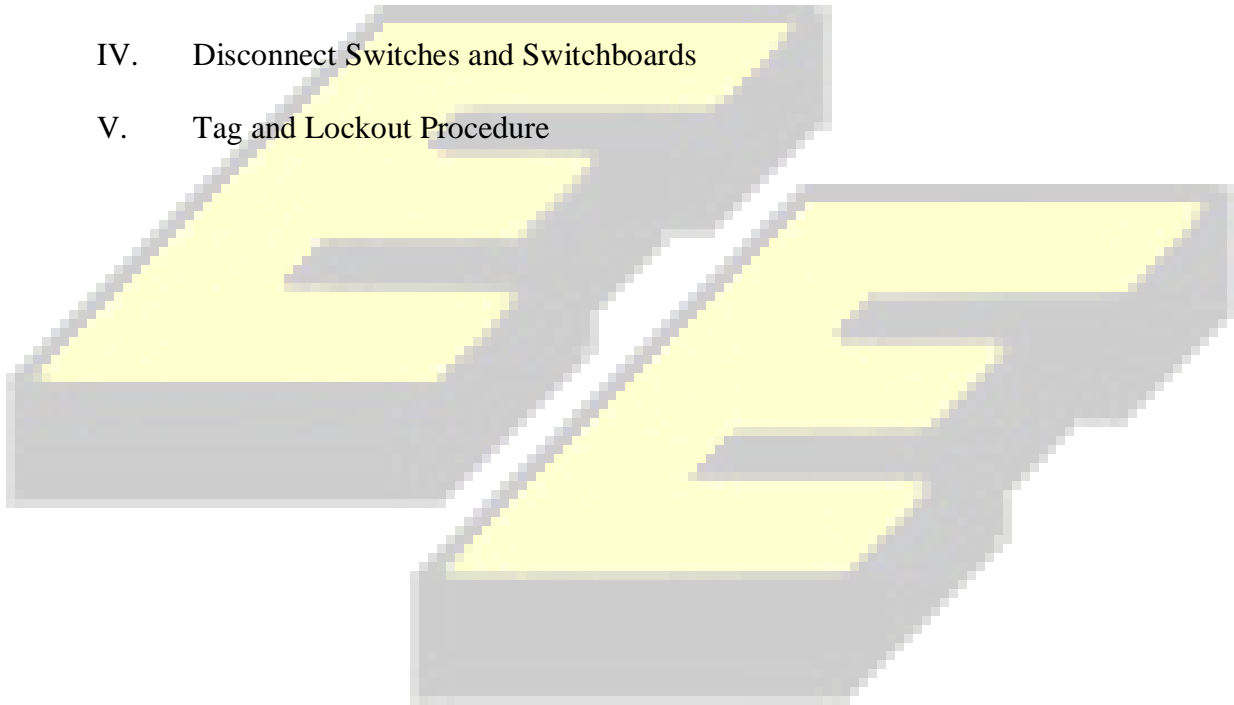
SECTION 6

ELECTRICAL SAFETY

ELECTRICAL SAFETY

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- I. General Information
- II. Working on Electrical Circuits
- III. Grounding and Bonding
- IV. Disconnect Switches and Switchboards
- V. Tag and Lockout Procedure



ELECTRICAL SAFETY

I. GENERAL INFORMATION

- A. Drawings, specifications and job site conditions shall be examined to determine the required safeguards and safety devices.
- B. The applicable accident prevention signs such as warning of temporary or permanent hazards, tags to attach to part(s) of the structure and equipment to warn of existing or immediate hazards; padlocks for the purpose to locking out equipment; barricades as an obstruction to deter the passage of persons or vehicles.
- C. All tools and equipment shall be inspected for faults and defects before they are used on the job site.
- D. ENERGY ERECTORS, INC. shall provide the necessary Personal Protective Equipment to meet ENERGY ERECTORS, INC. requirements.
- E. All local, state OSHA, and client requirements must be complied with.
- F. All electrical work, installations, wire capacities used on job site, both temporary and permanent, shall be in accordance with pertinent provisions of the National Electrical Code, NFPA-70. A copy of the current issue of this publication shall building wiring shall be protected by ground fault circuit interrupters or an assured grounding program.
- G. All electric power tools must be protected by ground fault circuit interrupters in damp locations.
- H. Electrical circuits shall be de-energized and locked out in accordance with the LOCKOUT/TAGOUT PROCEDURE prior to performance of any work on the circuits. In the event the circuits cannot be de-energized and tagged, no employee shall be permitted to work on or in close proximity to any part of an energized electrical circuits such that he might accidentally come in contact with or come within arcing distance of an energized part or component of the circuits unless the employee is protected against electric shock by guarding the part or component with insulating material appropriate for the voltage and component involved.
- I. In work area where the exact location of underground electric power lines is unknown, workmen using bars, hammers and other hand tools, which might come in contact with electric lines, shall be provided with insulated protective gloves.
- J. If any exposed or concealed electric power circuit is so located that the performance of the work may bring a person, tool, or machine into physical or electrical contact therewith, warning signs shall be posted and maintained in all areas where such circuits

exist. The employee shall be advised of the location of such lines, the hazards involved and the protective measures to be taken.

K. Barricades and warning signs shall be provided to ensure that workspace for electrical equipment is not used as a passageway during periods when energized parts of electrical equipment are exposed.

L. All fixed and portable electrical service equipment shall be contained in covered weatherproof boxes and;

1. Covers shall be kept closed.

2. Boxes shall be protected from exposure to weather, traffic, and combustible materials.

3. All equipment shall be rigidly mounted on a panel or frame and properly grounded.

4. All switches shall be clearly marked to indicate whether they are open or closed.

5. All switches shall be clearly marked to indicate whether they are open or closed.

6. Non-conducting elevated platforms or rubber mats shall be provided to protect employees operating switches from coming in contact with damp floor or earth.

7. Adequate, well-insulated wiring shall be provided and maintained.

M. Sufficient space shall be provided and maintained in the area of electrical equipment to permit ready and safe operation and maintenance of such equipment. When parts are exposed, the minimum clearance for the workspace shall not be less than a radius of 3 feet wide, and there shall be clearance sufficient to permit at least a 90° opening of all doors or hinged panels on equipment up to 600 volts. Check the tables in NFPA.70 for clearances over 600 volts.

N. All electrical equipment shall be installed in a neat and workmanlike manner.

O. All electrical equipment shall be firmly secured to the surface on which it is mounted.

P. All extension cords shall be of the three-wire grounded heavy duty type and shall be used only in continuous lengths without splices, except suitable molded or vulcanized splices may be used where properly made, and the splice insulation is equal to the insulation of the cable being spliced.

- Q. Cords shall be strung overhead or otherwise kept clear of working spaces and walkways or other locations in which they are readily exposed to damage. Cords are not to be fastened with staples, hung from nails or suspended by wire.
- R. Worn or frayed extension cords shall not be used.
- S. All circuit breaker panels, switchgear, etc. shall be properly labeled to clearly identify the units or pieces of equipment they control.
- T. All screwdrivers, pliers and other hand tools used on energized electrical equipment must be properly insulated.
- U. It must be understood that the required use of insulated screwdrivers and other tools does not provide an excuse for shortcutting any safe practice procedures regarding work on energized equipment.

II. WORKING ON ELECTRICAL CIRCUITS

- A. All electrical circuits shall be considered to be dangerous. Even electrical shocks from low voltages and currents have caused workmen to fall from ladders and scaffolds.
- B. Turn off, lock out and tag procedures shall be used when making repairs or extending light or power circuits. When this is impractical, procedures for working on energized circuits shall be observed.
- C. Treat so-called “dead lines” as though they are “hot”. Use testing equipment to verify that the circuit is not energized.
- D. Exercise extreme care when trouble shooting electrical circuits. Use proper personal protective equipment including insulated protective gloves, rubber sleeves and boots as appropriate.
- E. Make a complete check and test of the circuit before energizing any equipment for the first time. When the responsible person energizes a circuit(s) to equipment, have other employees stand a safe distance from the circuit and equipment.
- F. Grounding circuits shall be checked to ensure that the resistance between ground and the grounded power conductor is low enough to permit sufficient current to flow to cause the fuse or circuit breaker to interrupt power to the circuit.
- G. All temporary wiring shall be effectively grounded in accordance with the National Electrical Code, NFPA No. 70.
- H. Non-current-carrying metal parts of portable and/or plug-connected equipment shall be grounded.

- I. Insulation of Portable Electric Tools shall be checked on a regular basis.
- J. Portable tools and appliances protected by an approved system of double insulation, or its equivalent, need not be grounded. Where such an approved system is employed, the equipment shall be distinctively marked.
- K. Temporary lights shall be equipped with guards to prevent accidental contact with the bulb, except guards are not required when the construction of the grounded reflector is such that the bulb is deeply recessed and not accessible.
- L. When artificial lighting is required for work in damp or wet places (such as tanks, boilers, condensers, similar metal containers) a 6-volt or 12-volt portable system shall be used. Such a system employs a transformer that reduces voltages such as 110, 115 and 125, to 6-12 volts. The transformer is covered by a molded rubber jacket and had rubber-covered primary and secondary leads. The primary lead and transformer are placed outside the vessel or damp area and only the 6 or 12- volt lamp and secondary lead are taken into the work area. The use of low-voltage portable lighting equipment is an important safety measure for protection against electric shocks in such environments.
- M. When transferring flammable liquids from one container to another the containers shall be grounded and bonded with an effective ground/bond design as follows:
 - 1. Dispensing tank and pump to ground.
 - 2. Receiving container/vehicle to ground.
- N. In addition, any flammable liquid containers that are not in their original shipping containers with seals and fittings intact shall be grounded while in storage.

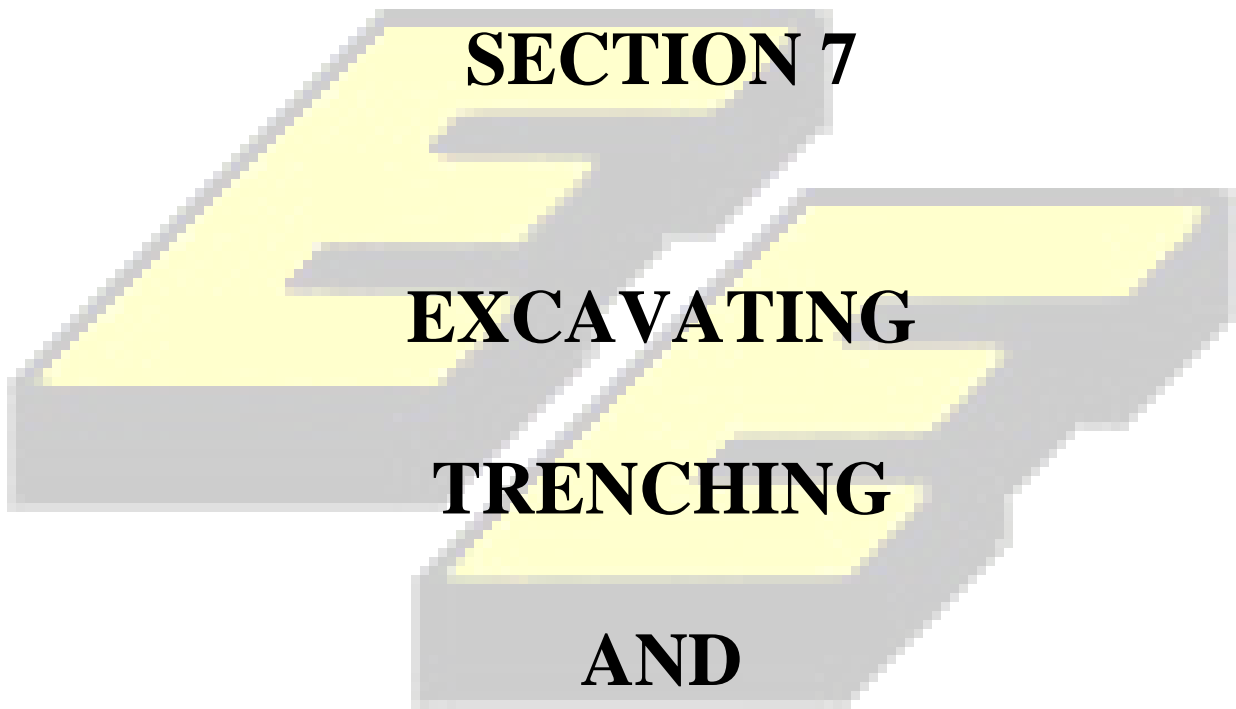
IV. DISCONNECT SWITCHES AND SWITCHBOARDS

- A. Open and close switches completely. Switches left in a partly open position may cause an arc or flashover with possible serious burns to the operator or damage to the switch.
- B. Open and close the switch in a firm positive manner using sufficient force to make or break full contact quickly to prevent unnecessary heating or arching.
- C. Determine the operating condition of the circuit before opening or closing any switch. This precaution is to ensure person protection in case the circuit is faulty or closing any switch. This precaution is to ensure personal protection in case the circuit is faulty or to protect another employee from exposure. If the circuit has been worked on, remove all ground jumpers before re-closing the switch.
- D. Each disconnecting device for motors, appliances, service feeder(s) or branch circuits shall be legibly marked at the disconnecting device to indicate its purpose.

- E. Disconnecting devices shall be located or shielded so that employees will not be injured by operation of the device.
- F. All enclosures for disconnecting devices shall be securely and rigidly fastened to the surface upon which they are mounted, and fitted with covers.
- G. Signs indicating danger and prohibiting unauthorized entrance shall be displayed at entrances to electrical switchboard/switchgear rooms.
- H. Keep all metal objects away from switchboards to avoid contact with live parts.
- I. The cleaning of switchboards shall only be done with the equipment that has been de-energized.
- J. If it is impracticable to de-energize switchboards or other equipment for cleaning or other work at least two qualified Journeymen shall work together and shall use insulating rubber gloves, rubber sleeves, mats and blankets to place a barrier between the workmen and ground or grounding apparatus to prevent electrical shock.

V. TAG AND LOCKOUT PROCEDURES

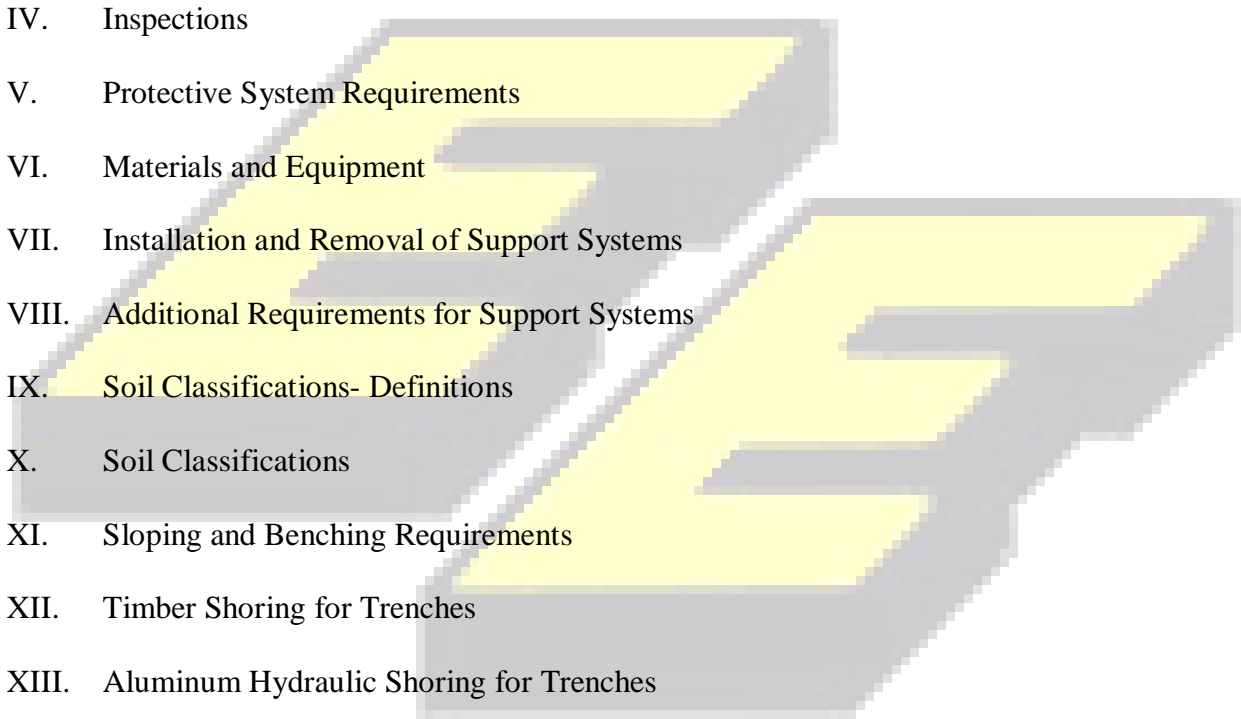
- A. The Lockout/ Tag out section of this manual provides the Safety Lockout/Tag out Procedure(s) that will be used by all ENERGY ERECTORS, INC. employees. Proper use of this procedure will protect personnel and equipment from accident or injury, caused by unauthorized startup of equipment.
 1. At no time shall work be done on a pump, compressor, turbine and other rotating or moving equipment without proper lockout and tagging of the electrical starting devices.
 2. Under no circumstances shall a switch or valve be operated until the tag and lock have been removed in accordance with the procedure described in the Lockout/Tag out Procedure.
 3. Controls: Controls that are to be deactivated during the course of work energized or de-energized. Equipment or circuits shall be tagged
 4. Equipment and circuits that are de-energized shall be rendered inoperative and shall have tags attached at all points, where such equipment or circuits can be energized.
 5. Tags: Tags shall be placed to identify plainly the equipment or circuits being worked on.



SECTION 7
EXCAVATING
TRENCHING
AND
SHORING

EXCAVATING, TRENCHING AND SHORING

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- 

EXCAVATING, TRENCHING, AND SHORING

I. PURPOSE

- A. The purpose of this section is to ensure the entry and subsequent work operations and exit from an excavation, trench, and ditch or like underground facilities are accomplished in a manner where safety, health, welfare, and protection are maintained at all times.

II. SCOPE

- A. Surface encumbrances that are located so as to create a hazard to employees shall be removed or supported as necessary to safeguard employees.
- B. Underground installations such as sewer, telephone, fuel, electric, water lines or any other installation that reasonably may be expected to be located prior to opening an excavation/trench.
- C. While the excavation/trench is open, underground installations shall be protected, supported or removed as necessary to safeguard employees.
- D. Means of egress from excavations/trenches such as a stairway, ladder, ramp or other safe means of egress, shall be located in excavations/trenches that are 4 feet or more in depth so as to require no more than 25 feet of lateral travel for employees.
- E. Employees exposed to public vehicular traffic shall be provided with and shall wear, warning vests or other suitable garments marked with or made of reflective or high-visible material.
- F. No employee shall be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials.
- G. Where the stability of adjoining buildings, walls or other structures is endangered by excavation/trench operations, support systems such as shoring, bracing or underpinning shall be provided to ensure the stability of such structures for the protection of employees.
- H. Adequate protection shall be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection consists of scaling to remove loose material.

- I. Employees in an excavation/trench shall be protected from cave-ins by an adequate protective system designed in accordance with the Section V, Protective system requirements.

III. EMERGENCY RESCUE/WARNING/EQUIPMENT/HAZARD PROTECTION

- A. Emergency rescue equipment such as breathing apparatus, safety harness and line and a basket stretcher shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation/trench.
- B. Where oxygen deficiency (atmospheres containing less than 19.5% oxygen) or a hazardous atmosphere exists, such as in excavations/trenches in landfill areas or excavations/trenches in areas hazardous substances are stored nearby, the atmosphere in the excavation/trench shall be tested before employees enter excavations/trenches greater than 4 feet in depth.
- C. Proper respiratory protection or ventilation shall be provided to prevent employee exposure to atmospheres containing less than 19.5% oxygen.
- D. When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure that the atmosphere remains safe.
- E. Warning systems such as barricades, hand or mechanical signals or stop logs shall be utilized. If possible, the grade should be away from the excavation/trench.
- F. Employees entering bell-bottom pier holes or other similar deep and confined footing excavation/trench, shall wear harness with a lifeline securely attached. The lifeline shall be separate from any line used to handle materials, and shall be individually attended at all times while the wearer is in the excavation.
- G. All employees shall be provided with personal protective equipment for the protection of head, eyes, ears, respiratory organs, feet, hands and other parts of the body.
 - 1. Head protection shall be worn at all times.
 - 2. Appropriate eye protection shall be worn when machines or operations present potential eye or face injury from physical, chemical or radiant agents.
 - 3. Whenever it is not feasible to reduce noise levels or duration of exposure, hearing protection shall be provided and used.
- H. Mechanical guards or protective devices shall be provided and used when hands and feet are exposed to potential injury from mechanical tools/ equipment.

- I. Where employees or equipment are required or permitted to cross over excavations, walkways or bridges including standard guardrails shall be provided.
- J. Adequate barrier physical protection shall be provided at all remotely located excavations/trenches. All wells, pits, shafts, etc., shall be barricaded or covered. Upon completion of exploration and similar operations, temporary wells, pits, shafts, etc., shall be backfilled.
- K. Employees shall not work in excavations/trenches in which there is accumulated water, or in excavations in which water is accumulating unless adequate precautions have been taken to protect employees against the hazards posed by such accumulations.

IV. INSPECTIONS

- A. An OSHA certified “Competent Person” must be on site at all times when excavation work is being performed and/or when employees are in an excavation.
- B. Daily inspection of excavations, including adjacent areas and protective systems shall be performed by a competent person for evidence of any situations that could result in possible cave-ins, indications of a failure of protective systems, hazardous atmospheres, or other hazardous conditions.
- C. Inspection shall also be performed after every rainstorm or other hazard-increasing occurrence.
- D. When the component person finds evidence of situation that could result in a possible cave-in, indication of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

V. PROTECTIVE SYSTEM REQUIREMENTS

- A. All employees in an excavation shall be protected from cave-ins b an adequate protective system designed in accordance with 1) sloping and benching configurations, 2) designs using other tabulated data. Exceptions are:
 - 1. Excavations/trenches are made entirely in stable rock.
 - 2. Excavations/trenches less than 5 feet in depth and examination of ground by competent safety personnel provides no indication of a potential cave-in.
- B. Protective systems shall have the capacity to resist without failure all loads that are intended or that could reasonably be expected, to be applied or transmitted to the system.

C. Slopes and configurations of sloping and benching systems shall be selected and constructed in accordance with the following allowable configurations and slope options:

1. Option 1. Excavations shall be sloped at an angle not steeper than one-half horizontal to one vertical (34° measured from the horizontal). Slopes shall be excavated to form configurations that are in accordance with the slopes shown for the Type C soil at the end of this section.
2. Option 2. Maximum allowable slopes and allowable configurations for sloping and benching systems shall be determined in accordance with the conditions and requirements set forth in the soil classifications definitions.
3. Option 3. Design of sloping or benching system shall be selected from and be in accordance with tabulated data, such as tables and charts. Tabulated data shall be in written form and shall include off of the following:
 - a. Identification of the parameters that effect the selection of a sloping or benching system drawn from pertinent data.
 - b. Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe.
 - c. Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.
 - d. At least one copy of the tabulated data, which identifies the registered professional engineer who approved the data, shall be maintained at the jobsite during construction and use of the protective system.
4. Option 4. Sloping and benching systems not utilizing Options 1,2 or 3 shall be approved by a registered professional engineer.
 - a. Designs shall be in written form and shall include at least:
 1. Maximum slopes that were determined to be safe for the particular project.
 2. Configuration that were determined to be safe for the particular project.
 3. Identity of the registered professional engineer approving the design.
 - b. At least one copy of the design shall be maintained at the jobsite while the slope is being constructed and used.

- D. Design of support systems, shield systems and other systems shall be selected and constructed in accordance with the following options:
1. Option 1. Designs for timber shoring in trenches shall be determined in accordance with the conditions and requirements set forth in the tables at the end of this section.
 2. Option 2. Design of support systems, shield systems or other protective systems that are drawn from manufacturer's tabulated data shall be in accordance with all specifications, recommendations and limitations issued or made by the manufacturer.
 - a. Deviation shall only be allowed after the manufacturer issues specific written approval.
 3. Option 3. Designs of support systems, shield systems or other protective systems shall be selected from and be in accordance with tabulated data such as tables and charts.
 4. Option 4. Support systems and other protective systems not utilizing Options 1, 2 or 3 shall be approved by a registered professional engineer.

VI. MATERIALS AND EQUIPMENT

- A. Materials and equipment used for protective systems shall be free from damage or defects that may impair proper function.
- B. Manufactured materials and equipment used for protective systems shall be used and maintained in a manner that is consistent with the recommendations of the manufacturer and in a manner that will prevent employee exposure to hazards.
- C. When material or equipment that is used for protective systems is damaged, supervisory personnel shall examine the material or equipment and evaluate its suitability for continued use. Defective or damaged material or equipment shall be immediately repaired or replaced.

VII. INSTALLATION AND REMOVAL OF SUPPORT SYSTEMS

- A. Members of support systems shall be securely connected together to prevent sliding, failing, kick outs or other predictable failure.
- B. Support systems shall be installed and removed in a manner that protects employees from cave-ins, structural collapses or from being struck by members of the support system.

- C. Removal shall begin at and progress from the bottom of the excavation. Members shall be released slowly so as to note any indication of possible failure or possible cave-in of the sides of the excavation.
- D. Backfilling shall progress in parallel with the removal of support systems from the excavation.

VIII. ADDITIONAL REQUIREMENTS FOR SUPPORT SYSTEMS

- A. Excavation of material to a level no greater than 2 feet below the bottom of the members of a support system shall be permitted, but only if the system is designed to resist the forces calculated for the full depth of the trench and there is no indication while the trench is open of a possible loss of soil from behind or below the bottom of the support system.
- B. Employees shall not be permitted to work on the faces of sloped or benched excavations at levels above other employees, except when employees at the lower levels are adequately protected from hazards of falling material.
- C. Shield systems shall not be subjected to loads exceeding those that the system was designed to withstand.
 - 1. Employees shall be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.
 - 2. Employees shall not be allowed in shields when shields are being installed, removed or moved vertically.

IX. SOIL CLASSIFICATION- DEFINITIONS

- A. Cemented Soil is a soil in which the particles are held together by a chemical agent such that a hand-size sample cannot be crushed into a powder or individual soil particles by finger pressure.
- B. Cohesive soil is clay or soil with, a high clay content that has cohesive strength soil does not crumble, can be excavated with vertical slide slopes, and is plastic when moist.
- C. Dry soil is soil that does not exhibit visible signs of moisture content.
- D. Fissured soil is soil material that has a tendency to break along definite planes of fracture with little resistance.
- E. Granular soil is gravel, sand or silt (coarse gravel soil) with little or no clay content and no cohesive strength.

- F. A Layered System is two or more distinctly different soil or rock types arranged in layers.
- G. Moist soil is a condition in which soil looks and feels damp.
- H. Plastic is a property of a soil, which allows the soil to be deformed and molded without cracking or appreciable volume change.
- I. Saturated soil is soil in which the voids are filled with water. Saturation does not require flow.
- J. Stable rock is natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.
- K. Submerged soil is soil, which is under water or is free seeping.
- L. Confined Compressive Strength is the load per unit area at which a soil will fail in compression.
- M. Wet Soil is soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow when vibrated.

X. SOIL CLASSIFICATIONS

- A. Type A. Cohesive soils with an unconfined compressive strength of 1.5 ton per square foot (tsf) or greater.
 - 1. Examples of cohesive soils are: clay, silty clay, sandy clay, and clay loam. Cemented soils such as caliche and hardpan are also considered Type A.
- B. Type B. Cohesive soil with an unconfined compressive strength greater than 0.5 tsf but less than 1.5 tsf.
- C. Type C. Cohesive soil with an unconfined compressive strength of 0.5 tsf or less.

XI. SLOPING AND BENCHING REQUIREMENTS

- A. Maximum allowable slope for a soil or rock deposit shall be determined from the tables at the end of this section.
- B. The actual slope shall not be steeper than the maximum allowable slope.
- C. Configurations of sloping and benching systems shall be in accordance with the charts at the end of this section.

XII. TIMBER SHORING FOR TRENCHES

- A. Soil type or types in which the excavation is made must be determined using the soil classification method set forth earlier in this section.
- B. Information is presented in several forms, as follows:
1. Presented in tabular form in Tables B-1 through B-6 from 1926.652. Each table presents the minimum size of timber members for use in a shoring system, and each type in which the excavation or portion of the excavation is made. The data is arranged to allow the user the flexibility to select from among several acceptable configurations or members, based on varying the horizontal spacing or the cross braces. Stable rock is exempt from shoring requirements; therefore, no data is presented for this condition.
- C. The sizes of the timber members in the attached tables are taken from the National Bureau of Standards. Required dimensions of the members refer to actual dimensions and not minimal dimensions of the timber.
- D. Shoring systems for use in situations that are not covered by the data in the rule must be designed as specified in 1926.652(c).
- E. When any of the following conditions are present, the members specified in the tables are not considered adequate. Either an alternate timber shoring system must be designed or another type of protective system designed in accordance with 1926.652.
1. When loads imposed by structures or by stored material adjacent to the trench weigh in excess of the load imposed by a 2-foot soil surcharge. "Adjacent: means the are within a horizontal distance from the edge of the trench equal to the depth of the trench.
 2. When vertical loads imposed in cross braces exceed a 240-pound gravity load distributed as a 1-foot section of the center of the center of the crossbar.
 3. When surcharge loads are present from equipment weighing in excess of 20,000 pounds.
 4. When only the lower portion of a trench is shored and the remaining portion of trench is shored and the remaining portion of the trench is sloped or benched unless: the sloped portion is sloped at an angle less steep than three horizontal to one vertical; or the members are selected from the tables for use at a depth which is determined from the top of the overall trench, and not from the toe of the sloped portion.
- F. The members of the shoring system that are to be selected using this information are the cross braces, uprights and wales, where wales are required. Minimum sizes of the members are specified for the use in different types of soil. There are six tables of information, two for each soil type. The soil type must first be determined in

accordance with the soil classification system described earlier in this section. Using the appropriate table, the selection of the size, and spacing of the members is than made. The selection is based on the depth and width of the trench where the members are to be installed and, in most instances, the selection is also based on the horizontal spacing of the cross braces.

G. In instances where a choice of horizontal spacing of cross bracing is available, the horizontal spacing of the cross braces must be chosen by the user before the size of any member can be determined. When the soil type, the width and depth of the trench and the horizontal spacing of the cross braces are known, the size and vertical spacing of wales and sized and horizontal spacing of the uprights can be read from the appropriate table.

H. Notes for all Tables. Member sizes at spacings other than indicated are to be determined as specified in 1926.652 (c).

1. When conditions are saturated or submerged, use tight sheeting. Tight sheeting refers to the use of specially edged timber planks (tongue and groove) at least 3 inches thick, steel sheet piling or similar construction that, when driven or placed in position, provides a tight wall to resist the lateral pressure of water and prevent the loss of backfill material.
2. All spacing indicated is measured center to center.
3. Wales are to be installed with the greater dimension being horizontal.
4. If the vertical distances from the center of the lowest cross brace to the bottom of the trench exceeds 2-1/2 feet, uprights shall be firmly embedded or a mudsill shall be used. Where uprights are embedded, the vertical distance from the center of the lowest cross brace to the bottom of the trench shall not exceed 36 inches. When mudsills are used, the vertical distance shall not exceed 42 inches. Mid sills are wales that are installed at the toe of the trench side.
5. Trench jacks may be used in lieu of or in combination with timber cross braces.
6. Placement of Cross braces. When the vertical spacing of cross braces is 4 feet, place the top cross brace no more than 2 feet below the top of the trench. When the vertical spacing is cross braces is 5 feet, place the top cross brace no more than 2.5 feet below the top of the trench.

XIII. ALUMINUM HYDRAULIC SHORING FOR TRENCHES

- A. Information is presented in tabular form in the tables at the end of this section. Figures illustrating typical installations of hydraulic shoring are included just prior to the tables at the end of the section.
- B. Vertical shore rails and horizontal wales that meet the section module requirements are shown in those tables.
- C. Hydraulic cylinders specifications:
 - 1. Two inch cylinders shall be a minimum 2 inches inside diameter with a minimum safe working capacity of no less than 18,000 pounds axial compressive load at maximum extension. Maximum extension is to include full range of cylinder extension as recommended by product manufacturer.
 - 2. Three inch cylinders shall be a minimum 3 inches inside diameter with a safe working capacity of not less than 30,000 pounds axial compressive load at extensions as recommended by product manufacturer.
- D. Limitation of application. It is not intended that the aluminum hydraulic shoring specifications apply to every situation that may be experienced in the field.
- E. When any of the following conditions are present, the number specified in the tables are not considered adequate.
 - 1. When vertical loads imposed on cross braces exceed a 100-pound gravity load distribution on a 1-foot section of the center of the hydraulic cylinder.
 - 2. When surcharge loads are present from equipment weighing in excess of 20,000 pounds.
 - 3. When only the lower portion of the trench is shored and the remaining portion of the trench is sloped or benched unless; The sloped portion is sloped at an angle less steep than three horizontal and one vertical; or the numbers are selected from the tables for use at a depth which is determined from the top of the overall trench, and not from the toe of the sloped portion.

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TABLE B-1
MAXIMUM ALLOWABLE SLOPES

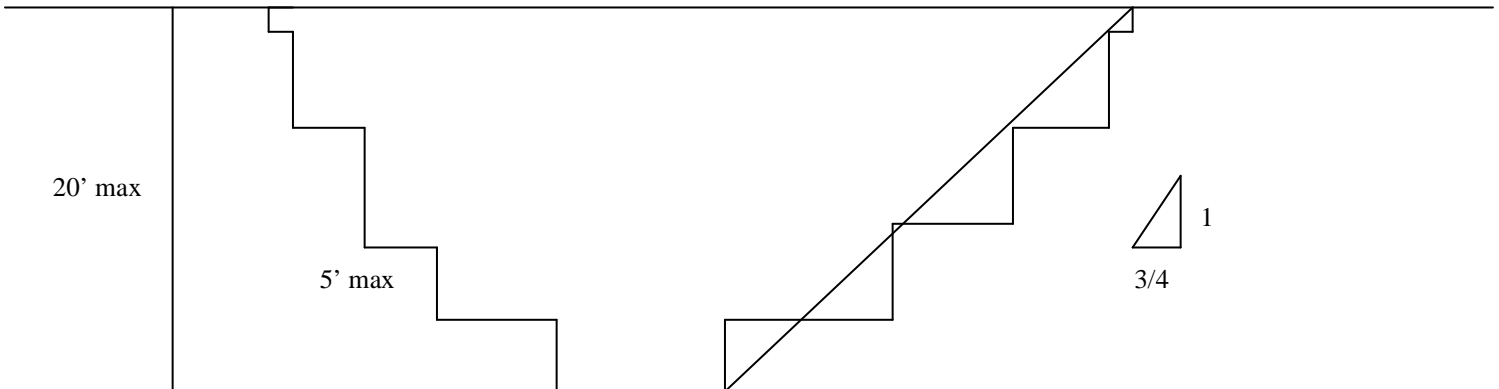
| SOIL OR ROCK TYPE FOR | MAXIMUM ALLOWABLE SLOPES (H: V) ⁽¹⁾ EXCAVATIONS LESS THAN 20 FEET DEEP ⁽³⁾ |
|--|---|
| STABLE ROCK TYPE A ⁽²⁾ 3/4: 1(53°) TYPE B TYPE C | VERTICAL (90°) 1:1 (45°) 1 1/2: 1(34°) |

¹ Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.

² A short-term maximum allowable slope of 1/2 H: 1V (63°) is allowable in excavations in Type A soil that are 12 feet (3.67m) or less in depth. Short term maximum allowable slopes for excavations greater than 12 feet (3.67m) in depth shall be 3/4 H: 1V(53°).

³ Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

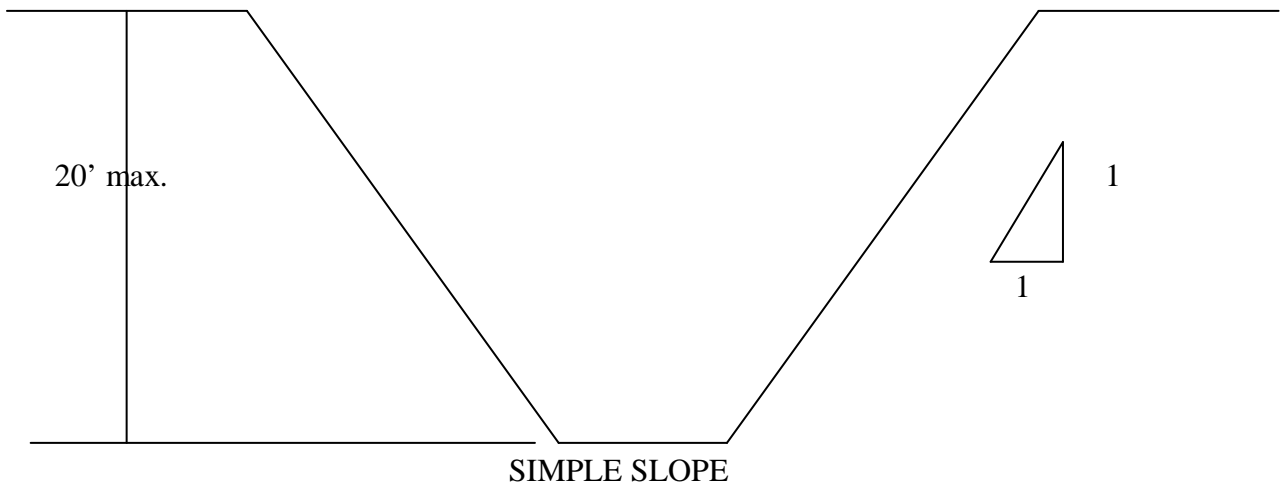
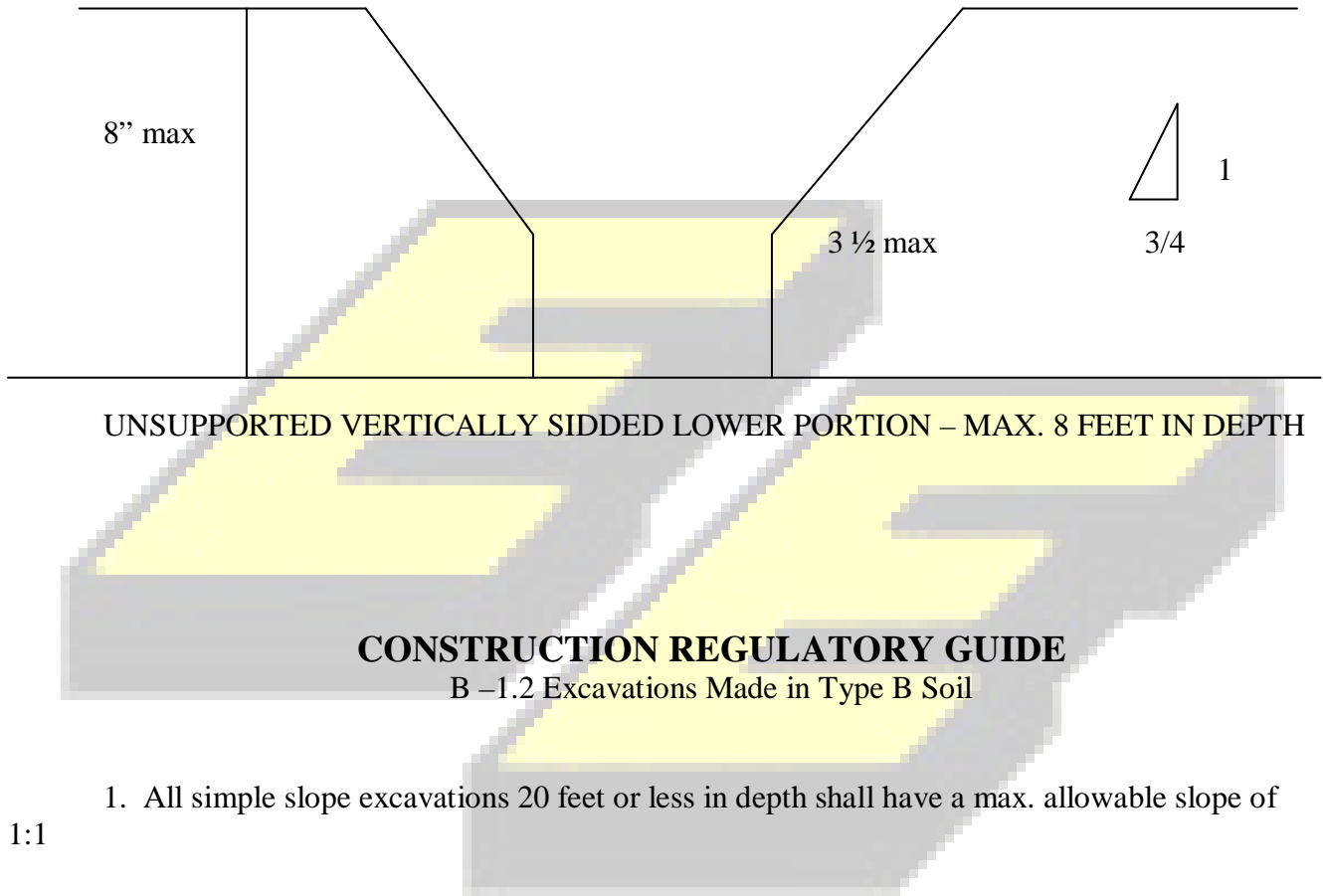
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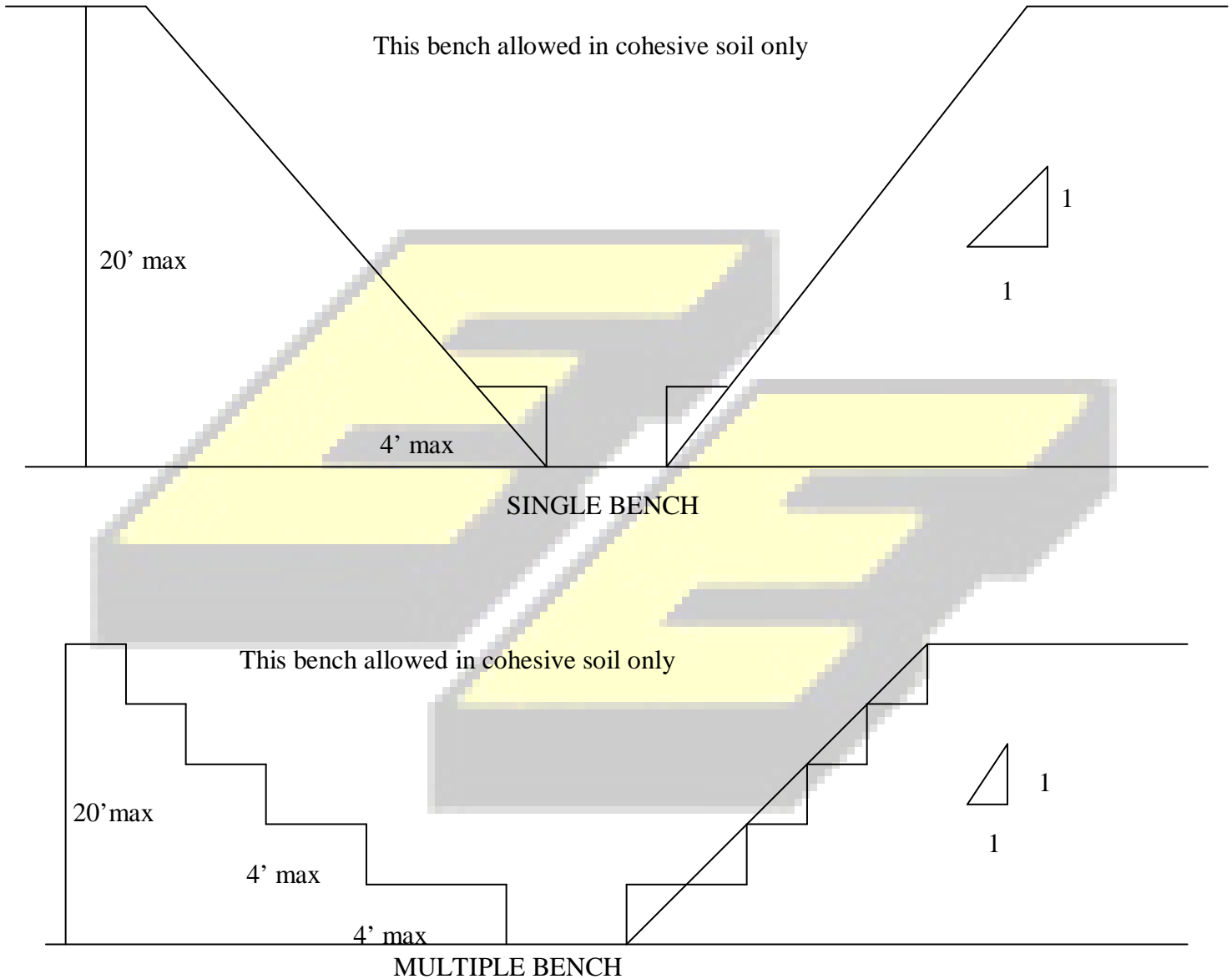
4' max

Multiple Bench

3. All excavations 8 feet or less in depth which have unsupported vertically sided lower portions shall have a maximum vertical side of 3 ½ feet.

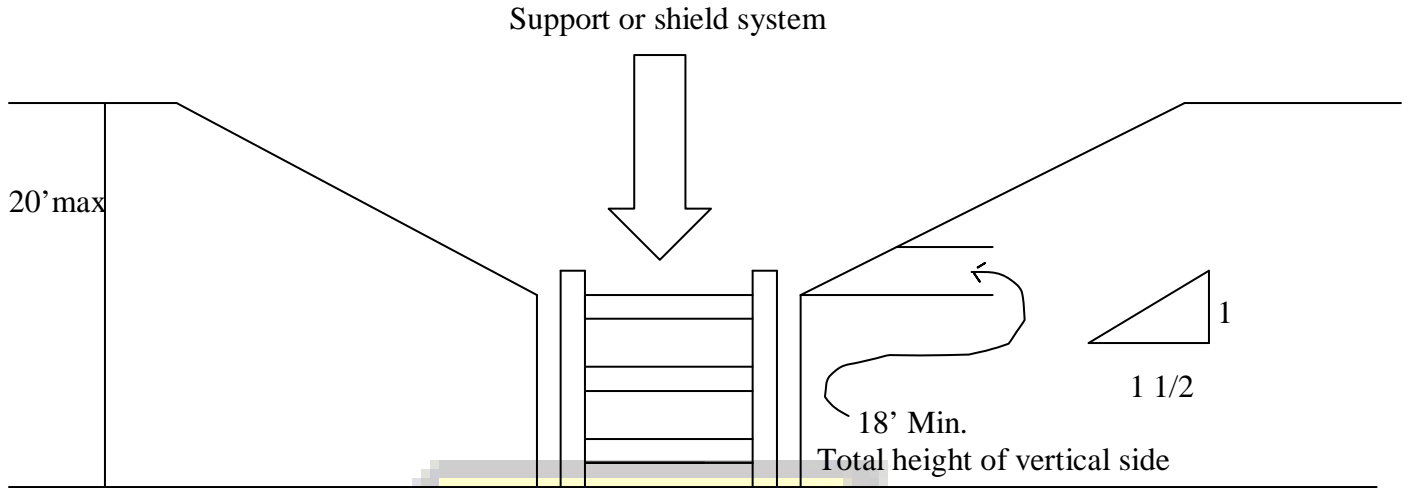


2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 and a maximum bench dimensions as follows:



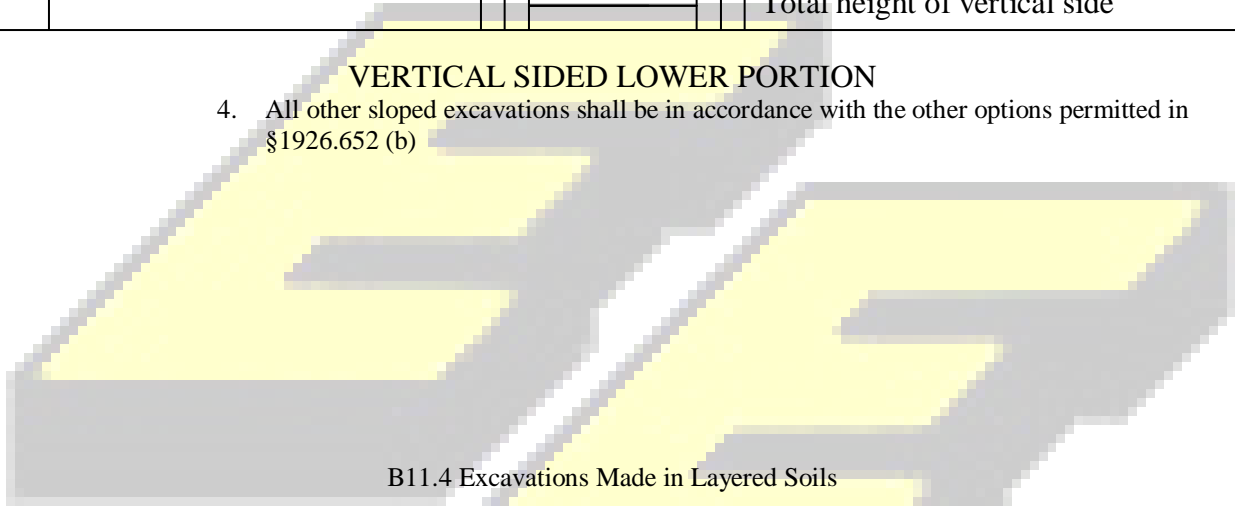
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2. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1 ½: 1.

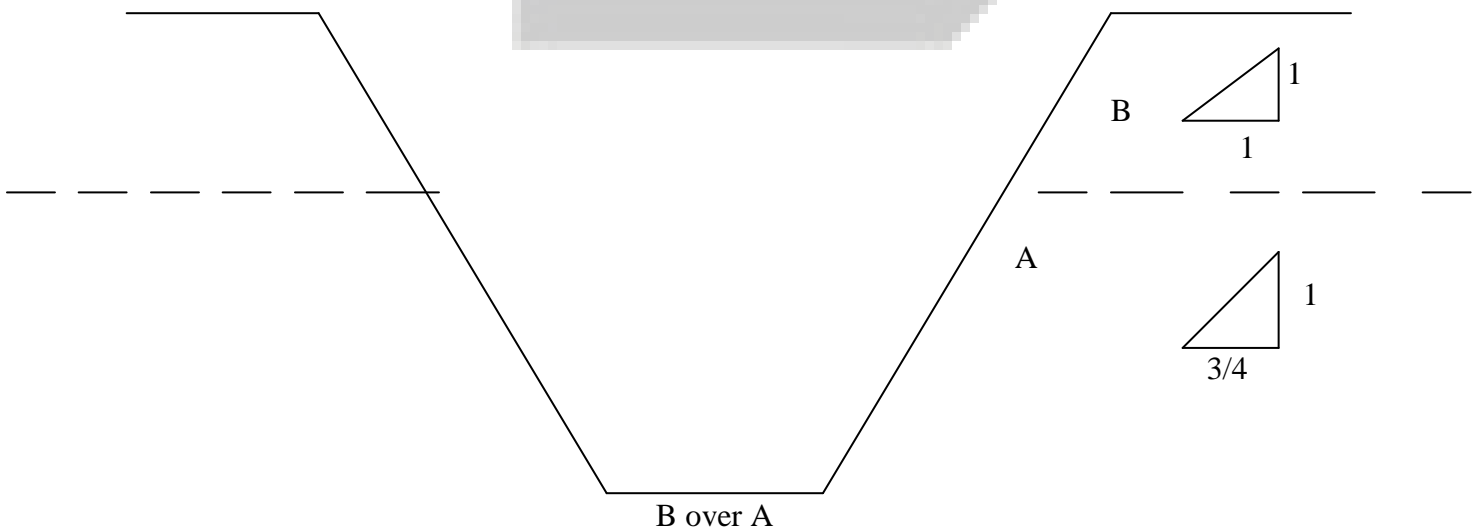


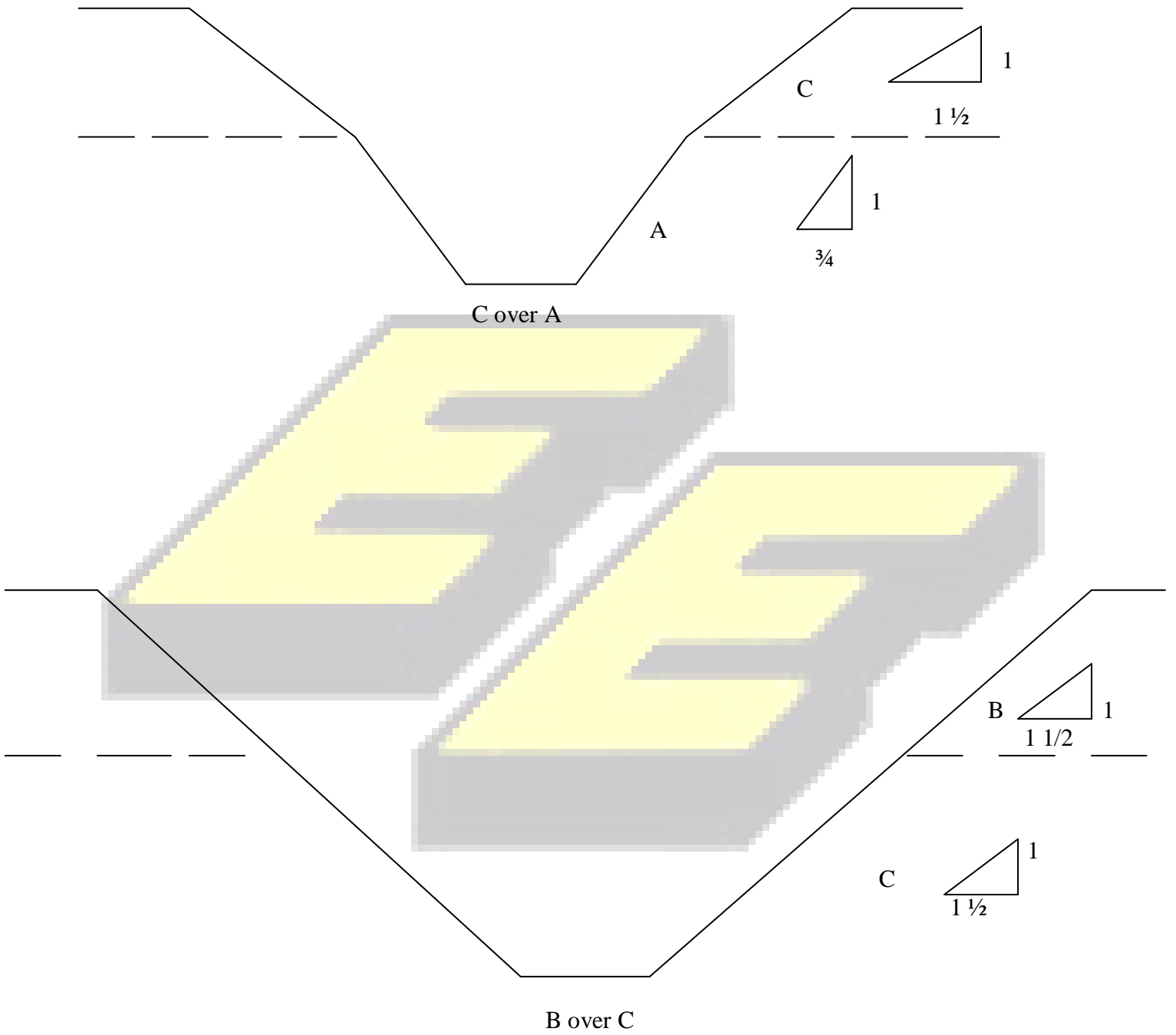
VERTICAL SIDED LOWER PORTION

4. All other sloped excavations shall be in accordance with the other options permitted in §1926.652 (b)



All excavations 20 feet or less in depth made in layered soils have a maximum allowable slope for each layer as set forth below.





2. All other sloped excavations shall be in accordance with the other options permitted in § 1926.652 (b).

C-1.2
TIMBER TRENCH SHORING-MINIMUM TIMBER REQUIREMENTS*
 SOIL TYPE B P a = 45 X H+ 72 psf (2 ft. Surcharge)

| DEPTH OF TRENCH (FEET) | SIZE (ACTUAL) AND SPACING OF MEMBERS** | | | | | | | | | | | UPRIGHTS | | | | | |
|------------------------|--|------------------------|------|------|----------------------|-----------|----------------------|-------|-------|-------|-------|------------------------------------|----|---|--|--|-----|
| | CROSS BRACES | | | | WALES | | | | | | | MAX. ALLOWABLE HORIZ. SPACING (FT) | 2 | 3 | | | |
| | HORIZ. SPACING (FEET) | WIDTH OF TRENCH (FEET) | | | VERT. SPACING (FEET) | SIZE (IN) | VERT. SPACING (FEET) | UP TO | UP TO | UP TO | UP TO | | | | | | |
| | | 4 | 6 | 9 | | | | | | | | 12 | 15 | | | | |
| 5 TO 10 | UP TO 6 | 4X6 | 4X6 | 6X6 | 6X6 | 5 | 6X8 | 5 | | | | | | | | | |
| | UP TO 8 | 6X6 | 6X6 | 6X6 | 6X8 | 5 | 8X10 | 5 | | | | | | | | | 2X6 |
| | UP TO 10 | 6X6 | 6X6 | 6X6 | 6X8 | 5 | 10X10 | 5 | | | | | | | | | 2X6 |
| 10 TO 15 | SEE NOTE | | | | | | | | | | | | | | | | |
| | UP TO 6 | 6X6 | 6X6 | 6X6 | 6X8 | 5 | 8X8 | 5 | | | | | | | | | 2X6 |
| | UP TO 8 | 6X8 | 6X8 | 6X8 | 8X8 | 5 | 10X10 | 5 | | | | | | | | | 2X6 |
| 15 TO 20 | UP TO 10 | 8X8 | 8X8 | 8X8 | 8X10 | 5 | 10X12 | 5 | | | | | | | | | |
| | SEE NOTE 1 | | | | | | | | | | | | | | | | |
| | UP TO 6 | 6X8 | 6X8 | 6X8 | 8X8 | 5 | 8X10 | 5 | | | | | | | | | 2X6 |
| OVER 20 | UP TO 8 | 8X8 | 8X8 | 8X8 | 8X10 | 5 | 10X12 | 5 | | | | | | | | | |
| | UP TO 10 | 8X10 | 8X10 | 8X10 | 10X10 | 5 | 12X12 | 5 | | | | | | | | | 3X6 |
| | SEE NOTE 1 | | | | | | | | | | | | | | | | |

Mixed oak or equivalent with a bending strength not less than 850 psi.
 ** Manufactured members of equivalent strength may be substituted for wood.

TABLE C-2.1
TIMBER TRENCH SHORING- MINIMUM TIMBER REQUIREMENTS*
 SOIL TYPE A Pa=25xH+75psf (2 ft Surcharge)

| DEPTH OF TRENCH (FEET) | SIZE (S4S) AND SPACING OF MEMBERS** | | | | | | | | | | | | | |
|------------------------|-------------------------------------|---------|---------|---------|----------|----------|----------------------|-----------|----------------------|------------------------------------|---|----------|-----|------|
| | Cross braces | | | | | | Wales | | | | | Uprights | | |
| | HORIZ. SPACING (FEET) | UP TO 4 | UP TO 6 | UP TO 9 | UP TO 12 | UP TO 15 | VERT. SPACING (FEET) | SIZE (IN) | VERT. SPACING (FEET) | MAX. ALLOWABLE HORIZ. SPACING (FT) | 4 | 5 | 6 | 8 |
| 5 TO 10 | up to 6 | 4x4 | 4x4 | 4x4 | 4x4 | 4x6 | 4 | not req'd | not req'd | | | | | |
| | up to 8 | 4x4 | 4x4 | 4x4 | 4x6 | 4x6 | 4 | not req'd | not req'd | | | | | 4x8 |
| | up to 10 | 4x6 | 4x6 | 4x6 | 6x6 | 6x6 | 4 | 8x8 | 4 | | | 4x6 | | |
| | up to 12 | 4x6 | 4x6 | 4x6 | 6x6 | 6x6 | 4 | 8x8 | 4 | | | | 4x6 | |
| 10 TO 15 | up to 6 | 4x4 | 4x4 | 4x4 | 6x6 | 6x6 | 4 | not req | not req | | | | | 4x10 |
| | up to 8 | 4x4 | 4x6 | 4x6 | 6x6 | 6x6 | 4 | 6x8 | 4 | | | 4x6 | | |
| | up to 10 | 6x6 | 6x6 | 6x6 | 6x6 | 6x6 | 4 | 8x10 | 4 | | | | 4x8 | |
| | up to 12 | 6x6 | 6x6 | 6x6 | 6x6 | 6x6 | 4 | 8x10 | 4 | | | 4x6 | | 4x10 |
| 15 TO 20 | up to 6 | 6x6 | 6x6 | 6x6 | 6x6 | 6x6 | 4 | 6x8 | 4 | | | | | |
| | up to 8 | 6x6 | 6x6 | 6x6 | 6x6 | 6x6 | 4 | 8x8 | 4 | | | 4x12 | | |
| | up to 10 | 6x6 | 6x6 | 6x6 | 6x6 | 6x8 | 4 | 8x10 | 4 | | | | | |
| | up to 12 | 6x6 | 6x6 | 6x6 | 6x8 | 6x8 | 4 | 8x12 | 4 | | | | | |
| OVER 20 | see note | | | | | | | | | | | | | |

*Douglas fir or equivalent with a bending strength not less than 1500 psi.
 **Manufactured members of equivalent strength may be substituted for wood.

TABLE C-2.3
TIMBER TRENCH SHORING- MINIMUM TIMBER REQUIREMENTS*
 SOIL TYPE C Pa = 80 X H + 72 psf (2ft Surcharge)

| DEPTH OF TRENCH (FEET) | SIZE (S4S) AND SPACING OF MEMBERS** | | | | | | | | | | |
|------------------------|-------------------------------------|---------|---------|---------|----------|----------|----------------------|-----------|----------------------|------------------------------------|--|
| | Cross braces | | | | Wales | | | | Uprights | | |
| | HORIZ. SPACING (FEET) | UP TO 4 | UP TO 6 | UP TO 9 | UP TO 12 | UP TO 15 | VERT. SPACING (FEET) | SIZE (IN) | VERT. SPACING (FEET) | MAX. ALLOWABLE HORIZ. SPACING (FT) | |
| 5 TO 10 | up to 6 | 6x6 | 6x6 | 6x6 | 6x6 | 8x8 | 5 | 8x8 | 5 | 3x6 | |
| | up to 8 | 6x6 | 6x6 | 6x6 | 8x8 | 8x8 | 5 | 10x10 | 5 | 3x6 | |
| | up to 10 | 6x6 | 6x6 | 8x8 | 8x8 | 8x8 | 5 | 10x12 | 5 | 3x6 | |
| | see note 1 | | | | | | | | | | |
| 10 TO 15 | up to 6 | 6x8 | 6x8 | 6x8 | 8x8 | 8x8 | 5 | 10x10 | 5 | 4x6 | |
| | up to 8 | 8x8 | 8x8 | 8x8 | 8x8 | 8x8 | 5 | 12x12 | 5 | 4x6 | |
| | see note 1 | | | | | | | | | | |
| | see note 1 | | | | | | | | | | |
| 15 TO 20 | up to 6 | 8x8 | 8x8 | 8x8 | 8x10 | 8x10 | 5 | 10x12 | 5 | 4x6 | |
| | see note 1 | | | | | | | | | | |
| | see note 1 | | | | | | | | | | |
| | see note 1 | | | | | | | | | | |
| | see note 1 | | | | | | | | | | |
| over 20 | see note 1 | | | | | | | | | | |
| | see note 1 | | | | | | | | | | |

• Douglas fir or equivalent with a bending strength not less than 1500 psi.
 ** Manufactured members of equivalent strength may be substituted for wood

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TABLE D-1.1
ALUMINUM HYDRAULIC SHORING
VERTICAL SHORES FOR SOIL TYPE A

| HYDRAULIC CYLINDERS | | | |
|----------------------|--------------------------------|------------------------------|---------------------------|
| DEPTH OF TRENCH (FT) | MAXIMUM HORIZONTAL SPACING(FT) | MAXIMUM VERTICAL SPACING(FT) | WIDTH OF TRENCH (FEET) |
| | | | UP TO 8 |
| OVER 5 UP TO 10 | 8 | | |
| OVER 10 UP TO 15 | 8 | 4 | 2 IN DIAMETER NOTE (2) |
| OVER 15 UP TO 20 | 7 | | 3 IN DIAMETER |
| OVER 20 | | | NOTE (1) |

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D. Item (g)

Note (1): See Appendix D. Item (g)(1)

Note (2): See Appendix D, Item (g)(2)

**TABLE D-1.2
ALUMINUM HYDRAULIC SHORING
VERTICAL SHORES FOR SOIL TYPE B**

| DEPTH OF TRENCH (FEET) | HYDRAULIC CYLINDERS | | | WIDTH OF TRENCH (FEET) |
|------------------------|----------------------------|------------------------------|------------------|-------------------------|
| | MAX. HORIZ. SPACING (FEET) | MAX. VERTICAL SPACING (FEET) | | |
| OVER 5 UP TO 10 | 8 | 4 | UP TO 8 | OVER 8 UP TO 12 |
| | | | OVER 10 UP TO 15 | OVER 12 UP TO 15 |
| OVER 10 UP TO 15 | 6.5 | 4 | 2 IN. DIAMETER | 2 IN. DIAMETER NOTE (2) |
| OVER 15 UP TO 20 | 5.5 | | 3 IN. DIAMETER | |
| OVER 20 | NOTE (1) | | | |

Footnotes to tables, and general notes on hydraulic shoring are found in Appendix D, Item (g)

Note(1) See Appendix D, Item (g)(1)

Note(2) See Appendix D Item (g)(2)

**TABLE D 1.4
ALUMINUM HYDRAULIC SHORING
WALER SYSTEMS FOR SOILD TYPE C**

| DEPTH OF TRENCH (FEET) | HYDRAULIC CYLINDER | | | | | | | | | | TIMBER UPRIGHTS | | | | |
|------------------------|----------------------|------------------------------------|------------------------|-----------------|------------------|--------------------|-------------------|-------------------|--------------------------------|-------------|-----------------|--------|-------|-------|----------|
| | VERT. SPACING (FEET) | SECT. * MODULUS (IN ³) | WIDTH OF TRENCH (FEET) | | | | | | MAX. HORIZ. SPACING(ON CENTER) | SOLID SHEET | 2 FEET | 3 FEET | | | |
| | | | UP TO 8 | OVER 8 UP TO 12 | OVER 12 UP TO 15 | Horizontal Spacing | Cylinder Diameter | Cylinder Diameter | | | | | | | |
| OVER 5 UP TO 10 | 4 | 3.5 | Horizontal Spacing | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 3 INCHES | 3 INCHES | 3 INCHES | 3X12 | ----- | ----- | |
| | | | Cylinder Diameter | 2 IN. | 2 IN. | 2 IN. | 2 IN. | 2 IN. | 2 IN. | 3 INCHES | 3 INCHES | | | | 3 INCHES |
| | | | Cylinder Diameter | 2 IN. | 2 IN. | 3 IN. | 3 IN. | 3 IN. | 3 IN. | 3 INCHES | 3 INCHES | | | | 3 INCHES |
| OVER 10 UP TO 15 | 4 | 7.0 | Horizontal Spacing | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 3 INCHES | 3 INCHES | 3 INCHES | 3X12 | ----- | ----- | |
| | | | Cylinder Diameter | 3 IN. | 3 IN. | 3 IN. | 3 IN. | 3 IN. | 3 IN. | 3 INCHES | 3 INCHES | | | | 3 INCHES |
| | | | Cylinder Diameter | 3 IN. | 3 IN. | 3 IN. | 3 IN. | 3 IN. | 3 IN. | 3 INCHES | 3 INCHES | | | | 3 INCHES |
| OVER 15 UP TO 20 | 4 | 14.0 | Horizontal Spacing | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 3 INCHES | 3 INCHES | 3 INCHES | 3X12 | ----- | ----- | |
| | | | Cylinder Diameter | 2 IN. | 2 IN. | 2 IN. | 2 IN. | 2 IN. | 2 IN. | 3 INCHES | 3 INCHES | | | | 3 INCHES |
| | | | Cylinder Diameter | 2 IN. | 2 IN. | 3 IN. | 3 IN. | 3 IN. | 3 IN. | 3 INCHES | 3 INCHES | | | | 3 INCHES |
| OVER 20 | NOTE 1 | | Horizontal Spacing | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 3 INCHES | 3 INCHES | | | | | |

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g).

Notes (1): See Appendix D, Item (g)(1)

Notes (2): See Appendix D, Item (g)(2)

* Consult product manufacturer and/ or qualified engineer for Section Modulus of available wales.

CONSTRUCTION REGULATORY GUIDE

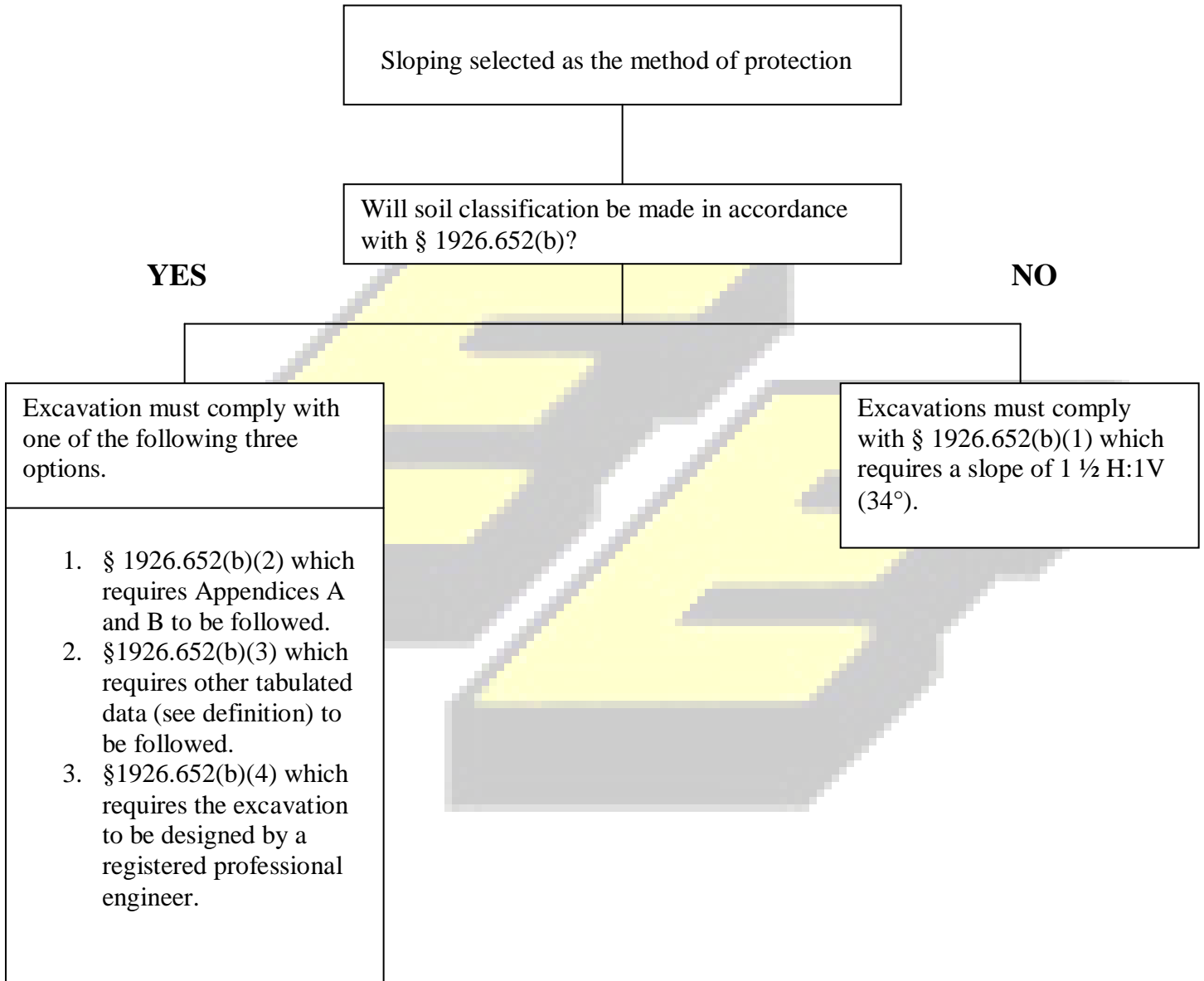
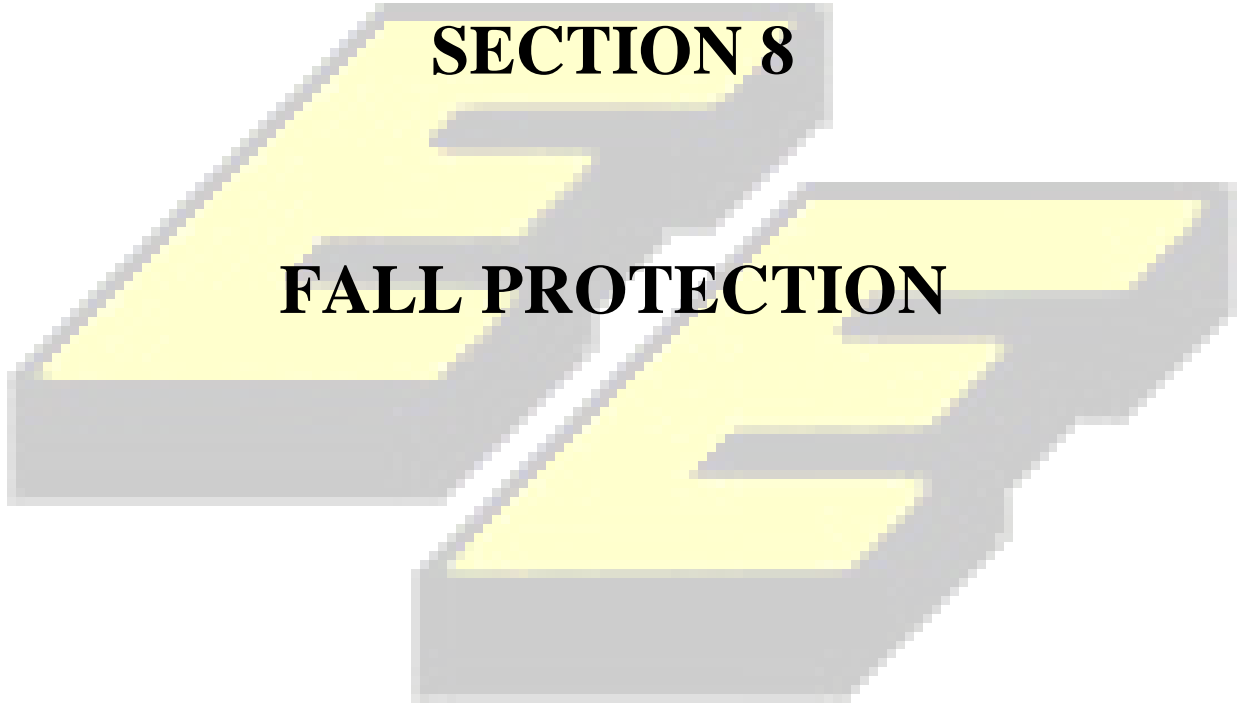


FIGURE 2- SLOPING OPTIONS



SECTION 8

FALL PROTECTION

FALL PROTECTION

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FALL PROTECTION

I. PURPOSE

This section is provided for assistance in complying with Federal OSHA's newly revised subpart "M" of 29 CFR1926, entitled Fall Protection.

II. SCOPE

The fall protection requirements of subpart "M" apply to all construction workplaces except where another subpart of 1926 specifies what fall protection systems must be used and sets the criteria for those fall protection systems. Energy Erectors, Inc.'s policy for fall protection is 100% tie-off with full body harness lanyard whenever exposed to a fall of six (6) feet or more, with an energy absorbing lanyard.

III. DEFINITIONS

- A. **Body belt** means a strap with a method both for securing it around the waist and for attaching it to a lanyard, lifeline, or deceleration device.
- B. **Body harness** means straps, which may be secured in a manner that will distribute fall arrest forces over the thighs, pelvis, waist, chest and shoulders with means for attaching it to other components of a personal fall arrest system.
- C. **Deceleration device** means any mechanism, such as a rope grab, rip-stitch lanyard, specially-woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards, etc., which serves to dissipate a substantial amount of energy during a fall arrest, otherwise limit the energy imposed on a worker during a fall arrest.
- D. **Free fall distance** means vertical displacement of a fall arrest attachment point on a worker's body belt or body harness between the onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, and lifeline/lanyard elongation, but includes any deceleration device slide distance or self-retracting lifeline/lanyard extension before they operate and fall arrest forces occur.
- E. **Infeasible** means it is impossible to perform construction work using a conventional fall protection system (i.e., guardrail system, safety net system, or personal fall arrest system) or it is technologically impossible to use any one of these systems to provide fall protection.
- F. **Lanyard** means a flexible line of rope, wire rope, or nylon strap, which generally has a connector at each end for connecting a body harness to a lifeline, or anchorage. This lanyard must include a deceleration device of some kind.

- G. Leading edge** means edge of floor, roof, or form work for a floor or other walking/working surface (such as the deck) which changes location as additional floor, roof, decking or form work sections are placed, formed, or constructed. A leading edge is considered to be an “unprotected side and edge” during periods when it is not actively continuously under construction.
- H. Lifeline** means 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), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.
- I. Low-slope roof** means a roof having a slope less than or equal to 4 in 12 (vertical and horizontal).
- J. Opening** means a gap or void 30 inches or more high and 18 inches or more wide, in a wall or partition, through which workers can fall to a lower level.
- K. Overhand bricklaying** and related work means that process of laying bricks and masonry units such that the surface of the wall to be jointed is on the opposite side of the wall from the mason, requiring the mason to lean over the wall to complete the work. Related work includes mason tending and electrical installation incorporated into the brick wall during the overhand bricklaying process.
- L. Personal fall arrest system** means a system used to arrest a worker in a fall from a working level. It consists of an anchorage point, connectors, a body belt or body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these.
- M. Positioning device system** means a body belt or body harness system rigged to allow a worker to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning.
- N. Rope grab** means a deceleration device, which travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of a worker. A rope grab usually employs the principle of inertial locking, cam/level. Locking or both.
- O. Self-retracting lifeline/lanyard** is a deceleration device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under slight tension during normal worker movement, and which, at the onset of a fall, automatically locks the drum and arrests the fall.

P. **Snaphook** means a connector comprised of a hook-shaped member with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object and, when released, automatically closes to retain the object. Snaphooks are generally one of two types.

1. The locking type with a self-closing, self-locking keeper which remains closed and locked until unlocked and pressed open for connection or disconnection; or
2. The non-locking type with a self-closing keeper which remains closed until presses open for connection or disconnection. This type is no longer acceptable and must be removed from service immediately.

Q. **Steep roof** means a roof having aslope greater than 4 in 12 (vertical or horizontal).

R. **Work Area** means that portion of a walking/working surface where job duties are being performed.

IV. **PROTECTIVE SYSTEMS**

A. Guardrails and Guardrail Systems

1. Guardrail system means a barrier erected to prevent workers from falling to lower levels. Guardrails should have a top edge member 42 inches (plus or minus 3 inches) above the walking/working level. When workers are using stilts, the top edge height of the top rail should be increased to an amount equal to the stilt height.
2. Midrails, screens, mesh, intermediate vertical members, or equivalent intermediate structural members should be installed between the top edge of the guardrail system and walking/working surface when there is no wall or parapet wall at least 21 inches high.
3. Midrails should be installed midway between the top edge of the guardrail system and walking/working level. Screens and mesh, when used, should extend from the top rail to the walking/working level and along the entire opening between the top rail supports.
4. Intermediate members(such as balusters), when used between posts, should not be more than 19 inches apart.
5. Other structural members (such as additional midrails and architectural panels) should be installed so there are no openings in the guardrail system more than 19 inches wide.
6. Guardrail systems should be capable of withstanding, without failure, a force of at least 200 pounds applied within 2 inches of the top edge, in any outward or downward direction, the top edge of the guardrail should not deflect to a height less than 39 inches above the walking/working level.

7. Midrails, screens, mesh, intermediate vertical members, solid panels, and equivalent structural members should be capable of withstanding, without failure, a force of at least 150 pounds applied in any downward or outward direction at any point.
8. Guardrail systems should be surfaced so as to prevent injury from punctures or lacerations and snagging of clothing. Ends of all top rails and midrails should not overhang terminal post, except where such overhang does not constitute a project hazard. Unsuitable materials such as steel or plastic banding should not be used as top rails or midrails.
9. Top rails and midrails should be at least one-quarter inch nominal diameter or thickness to prevent cuts and lacerations. Wire rope top rails should be flagged at not more than 6 foot intervals with high-visibility material.
10. Guardrail systems used at hoisting areas should have a chain, gate or removable guardrail section across the access opening when hoisting operations are not taking place. Guardrail systems used at hold should be erected on all unprotected sides or edges of the hole.
11. When guardrail systems are used around holes used for the passage of materials, the hole should have not more than two sides provided with removable guardrail sections to allow passage of materials. When the hole is not in use, it should be closed over with a cover, or a guardrail system should be provided along all unprotected sides or edges.
12. When guardrails systems are used around holes which are used as points of access (such as ladder ways), they should be provided with a gate, or be offset so a person cannot walk directly into the hole. Guardrail systems used on ramps and runways should be erected along each unprotected side or edge.
13. Manila, plastic or synthetic rope used for top rails or midrails should be inspected as frequently as necessary to ensure it continues to meet strength requirements.
14. Wood Railings are assumed to meet the requirements if:
 - a. Wood components are a minimum 1500 lb-ft/in (2) fiber (stress grade) construction grade lumber.
 - b. Posts are at least 2-inch by 4-inch lumber spaced not more than 8 feet (2.4m) apart on centers.
 - c. Top railings are at least 2-inch by 4-inch lumber.
 - d. Intermediate railings are at least 1-inch by 6-inch lumber.

All lumber dimensions are nominal sizes as provided by the American Softwood Lumber Standards, dated January 1970.

15. Pipe railings are assumed to meet the requirements if:

- a. Posts are at least one and one-half inches nominal diameter (schedule 40 pipe) spaced not more than 8 feet apart on centers.
- b. Top railings are at least one and one-half inches nominal diameter (schedule 40 pipe).
- c. Intermediate railings are at least one and one-half inches nominal diameter (schedule 40 pipe).

16. Structural steel railings are assumed to meet the requirements if;

- a. Posts are at least 2-inch by 2-inch by 3/8-inch angles, with posts spaced not more than 8 feet apart on centers.
- b. Top railings are at least 2-inch by 2-inch by 3/8-inch angles.
- c. Intermediate railings are at least 2-inch by 2-inch by 3/8-inch angles.

B. SAFETY NET SYSTEMS

1. Safety nets should be installed as close as practicable under the surface on which workers are working, but in no case more than 30 feet below. When nets are used on bridges, the potential fall area from the walking/working surface to the net should be unobstructed.

2. Safety nets should extend outward from the outermost projection of the work surface as follows:

Vertical distance from Working level to horizontal Plane of net

Minimum required horizontal distance of outer edge of net from the edge of the Working surface

Up to 5 feet

8 feet

More than 5 feet up to 10 feet

10 feet

More than 10 feet

13 feet

- 3. Safety nets should be installed with sufficient clearance to prevent contact with the surface of structures below when subjected to an impact force.
- 4. Safety nets and safety net installations should be drop-tested after initial installation and before being used as a fall protection system, whenever relocated, after major repair, and at 6-month intervals if left in one place.
- 5. The test consists of a 400 pound bag of sand 30 inches in diameter dropped into the net from the highest surface at which workers are exposed to fall hazards, but not from less than 42 inches above that level.
- 6. When an employer can demonstrate it is unreasonable to perform a drop-test, the employer (or a designated competent person) should certify that net and net installations are in compliance by preparing a certification record prior to the net being used as a fall protection system. Certification records include identification

of the certification record is being prepared; date was determined that the identified net and net installation were in compliance and the signature of the person making the determination and the certification. The most recent certification record for each net and net installation should be available at the jobsite.

7. Defective nets should not be used. Safety nets should be inspected at least once a week for wear, damage, and other deterioration. Defective components should be removed from service. Safety nets should also be inspected after any occurrence which, could affect their integrity.
8. Materials, scrap pieces, equipment, and tools which have fallen into a safety net should be removed as soon as possible and at least before the next work shift.
9. The maximum size of each safety net mesh opening should not exceed 36 square inches nor be longer than 6 inches on any side. All mesh crossings should be secured to prevent enlargement of the mesh opening.
10. Each safety net (or section of it) should have a border rope for webbing with a minimum breaking strength of 5,000 pounds. Connections between safety net panels should be as strong as integral net components and spaced not more than 6 inches apart.

V. PERSONAL FALL ARREST SYSTEMS

A. Body belts and Harnesses

1. Body belt Or safety belt means a strap with a method both for securing it around the waist and for attaching it to a lanyard, lifeline, or deceleration device. Body harness means straps which, may be secured around a worker in a manner that will distribute fall arrest forces over the thighs, pelvis, waist, chest and shoulders with means for attaching it to other components of a personal fall arrest system. **Effective January 1, 1998, body belts should not e used as part of a personal fall arrest system.**

Note: The use of a body belt as a positioning device system is acceptable if used according to the regulations.

2. Dee-rings and snaphooks should have a minimum tensile strength of 5,000 pounds.
3. Snaphooks should be sized to be compatible with the member to which they are connected to prevent roll out. **Effective January1, 1998, only locking type snaphooks should be used.**
4. Unless a snaphook is the locking type and designed for the following connections, snaphooks should not be engaged:

- a. Directly to webbing, rope or wire rope;
 - b. To each other;
 - c. To a D-ring to which another snaphook or other connector is attached.
 - d. To a horizontal lifeline; or
 - e. To any object which, is incompatibly shaped or dimensioned, in relation to the snaphook such that unintentional disengagement could occur.
5. On suspended scaffolds or similar work platforms with horizontal lifelines which may become vertical lifelines, devices used to connect to a horizontal lifeline should be capable of locking in both directions on the lifeline.
 6. Horizontal lifelines should be designed, installed, and used, under the supervision of a qualified person, as part of a complete personal fall arrest system maintaining a safety factor of at least two.
 7. Lanyards and vertical lifelines should have a minimum breaking strength of 5,000 pounds.
 8. When vertical lifelines are used, each worker should be attached to a separate lifeline.
 9. During construction of elevator shafts, two workers may be attached to the same lifeline in the hoistway, provided both workers are working on a false car equipped with guardrails; the strength of the lifeline is 10,000 pounds and all other criteria for lifelines have been met.
 10. Lifelines should be protected against being cut or abraded.
 11. Self-retracting lifeline and lanyards which automatically limit free fall distance to 2 feet or less should be capable of sustaining a minimum tensile load of 3,000 pounds. Self-retracting lifelines and lanyards which do not limit free fall distance to 2 feet or less, ripstitch lanyards, and tearing and deforming lanyards will be capable of sustaining a minimum tensile load of 5,000 pounds.
 12. Anchorages used for attachment of personal fall arrest equipment should be;
 - a. Independent of anchorage being used to support or suspend platforms.
 - b. Capable of supporting at least 5,000 pounds per worker.
 - c. Designed, installed and used under the supervision of a qualified person as part of a complete personal fall arrest system which maintains a safety factor of at least two.
 13. Personal fall arrest systems, when stopping a fall, should;

- a. Limit maximum arresting force on a worker to 900 pounds when used with a body belt.
 - b. Limit maximum arresting force on a worker to 1,800 pounds when used with a body harness.
 - c. Be rigged so a worker can neither free fall more than 6 feet, nor contact any lower level.
 - d. Bring a worker to a complete stop and limit maximum deceleration distance a worker travels to 3.5 feet.
 - e. Have sufficient strength to withstand twice the potential impact energy of a worker free falling a distance of 6 feet for the free fall distance permitted by the system, whichever is less.
14. Attachment point of a body belt should be located in the center of the wearer's back. The attachment point of a body harness should be located in the center of the wearer's back near shoulder level, or above the wearer's head.
 15. Body belts, harnesses, and components should be used only for worker protection and not to hoist materials. Personal fall arrest systems and components subjected to impact loading should be immediately removed from service and not be used again for worker protection until inspected and determined by a competent person to be undamaged and suitable for reuse.
 16. Employers should provide for prompt rescue of workers in the event of a fall or assure workers are able to rescue themselves.
 17. Personal fall arrest systems should be inspected prior to each use for wear, damage and other deterioration, and defective components should be removed from service.
 18. Personal fall arrest systems should not be attached to guardrail systems. When a personal fall arrest system is used at a hoist area, it should be rigged to allow movement of the worker only as far as the edge of the walking/working surface.

VI. POSITIONING DEVICE SYSTEMS

- A. Positioning devices should be rigged so a worker cannot free fall more than 2 feet. Positioning devices should be secured to an anchorage point capable of supporting at least twice the potential impact load of a workers fall of 3,000 pounds, whichever is greater.
- B. Connecting assemblies should have a minimum tensile strength of 5,000pounds. Dee-rings and snaphooks should be proof-tested to a minimum tensile load of 3,600 pounds without cracking, breaking, or taking permanent deformation.
- C. Snaphooks should be sized to be compatible with the member to which they are connected to prevent rollout, or should be a locking type snaphook designed and used to prevent disengagement. **As of January 1, 1998 only locking type snaphooks should be used.**

D. Unless the snaphook is a locking type designed for the following connections, snaphooks should not be engaged:

1. Directly to webbing, rope or wire rope;
2. To each other;
3. To a D-ring to which another snaphook or other connector is attached;
4. To a horizontal lifeline; and
5. To any object incompatibly shaped or dimensioned in relation to the snaphook such that unintentional disengagement could occur.

E. Positioning device systems should be inspected prior to each use for wear, damage, and other deterioration, and defective components should be removed from service.

VII. WARNING LINE SYSTEMS

A. Warning line system means a barrier erected on a roof to warn workers that they are approaching an unprotected roof side or edge, and which designates an area in which roofing work may take place without use of guardrail, body belt, or safety net systems.

B. Warning line systems should comply with the following provisions:

1. Warning lines should be erected around all sides of roof work area.
2. When mechanical equipment is not being used, warning lines should be not less than 6 feet from roof edge.
3. When mechanical equipment is being used, warning lines should be not less than 6 feet from the roof edge which is parallel to the direction of mechanical equipment operation, and not less than 10 feet from roof edge perpendicular to the direction of mechanical equipment operation.
4. Points of access, materials handling areas, storage areas, and hoisting areas should be connected to the work area by an access path formed by two warning lines.
5. When the path to a point of access is not in use, a rope, wire, chain, or other barricade, equivalent in strength and height to the warning line, should be placed across the path at the point where the path intersects the warning line erected around the work area, or the path is offset so a person cannot walk directly into the work area.

C. Warning lines consist of ropes, wires, or chains, and supporting stanchions erected as follows:

1. Rope, wire, or chain should be flagged at not more than 6-foot intervals with high-visibility material.

2. Rigged and supported so the lowest point is no less than 34 inches and highest point is no more than 39 inches from walking/working surface
 3. With lines attached, stanchions should be capable of resisting, without tipping over, a force of at least 16 pounds applied horizontally against the stanchion, 30 inches above the walking/working surface, perpendicular to the warning line, and in the direction of the floor, roof, or platform edge.
 4. Rope, wire, or chain should have minimum tensile strength of 500 pounds.
 5. Lines should be attached at each stanchion in such a way that pulling on one section of the line between stanchions will not result in slack being taken up in adjacent sections before stanchion tips over.
- D. No worker should be allowed in the area between a roof edge and a warning line unless performing roofing work. Mechanical equipment on roofs should be used or stored only in areas where workers are protected by a warning line system, guardrail system, or personal fall arrest system.

VIII. CONTROLLED ACCESS ZONES

- A. Controlled access zone (CAZ) means an area in which certain work (e.g., overhand bricklaying) may take place without use of guardrail systems, personal fall arrest systems, or safety net systems and access to the zone is controlled.
- B. Controlled access zones and their use conform to the following provisions:
1. When used to control access to areas where leading edge and other operations are taking place the controlled access zone should be defined by a control line or other means that restrict access.
 2. Control lines when used, should be erected not less than 6 feet nor more than 25 feet from unprotected or leading edges, except when erecting pre-cast concrete members.
 3. When erecting pre-cast concrete members, control lines should be erected not less than 6 feet nor more than 60 feet or half the length of the member being erected, whichever is less, from the leading edge.
 4. Control lines should extend along the entire length of the unprotected or leading edge, approximately parallel to the unprotected or leading edge.
 5. Control lines should be connected on each side of a guardrail system or wall.
- C. When used to control access to areas where overhand bricklaying and related work are

taking place the following apply:

1. The controlled access zone should be defined by a control line erected not less than 10 feet but not more 15 feet from the working edge.
2. Control lines should extend to enclose all workers performing overhand bricklaying and related work at the working edge and should be approximately parallel to the working edge.
3. Additional control lines should be erected at each end to enclose the controlled access zone.
4. Only workers engaged in overhand bricklaying or related work should be permitted in the controlled access zone.

D. Control lines should consist of ropes, wires, tapes or equivalent materials, and supporting stanchions, as follows:

1. Lines should be flagged or otherwise clearly marked at not more than 6-foot intervals with high visibility material.
2. Each line should be rigged and supported so its lowest point is not less than 39 inches and its highest point is not more than 45 inches (50 inches when overhand bricklaying operations are being performed) from the walking/working surface.
3. Each line should have a minimum breaking strength of 200 pounds.

- E. On floors and roofs where guardrail systems are not in place prior to the beginning of the overhand bricklaying operations, controlled access zones will be enlarged, as necessary, to enclose all points of access, material handling areas, and storage areas.
- F. On floors and roofs where guardrail systems are in place, but need to be removed to allow for overhand bricklaying work or leading edge work, only the portion of the guardrail necessary to accomplish that day's work should be removed.

IX. SAFETY MONITORING SYSTEMS

- A. Safety-monitoring system means a safety system in which a competent person is responsible for recognizing and warning workers of fall hazards. When used, safety monitoring systems should comply with the following provisions.
- B. A competent person should be designated to monitor safety of other workers complying with the following requirements.
1. The safety monitor should be competent to recognize fall hazards.

2. The safety monitor should warn workers when it appears they are unaware of a fall hazard or are acting unsafely.
3. The safety monitor should be on the same surface within visual sighting distance of workers being monitored.
4. The safety monitor should be close enough to communicate orally with workers.
5. The safety monitor should not have other responsibilities, which could take his or her attention from the monitoring function.

C. Mechanical Equipment should not be used or stored in areas where safety monitoring systems are being used to monitor workers engaged in roofing operations on low-slope roofs: No worker, other than a worker engaged in the fall protection plan, should be allowed in an area where a worker is being protected by a safety monitoring system.

D. Workers working in a controlled access zone should be required to comply promptly with fall hazard warnings from safety monitors.

X. COVERS

A. Hole means a gap or void 2 inches or more in its least dimension in a floor, roof, or other walking/working surface. Covers for holes in floors, roofs and other walking/ working surfaces should meet the following requirements:

1. Covers located in roadways and vehicular aisles should be capable of supporting, without failure, at least twice the maximum axle load of the largest vehicle expected to cross over the cover.
2. All other covers should be capable of supporting, without failure, at least twice the weight of workers equipment, and materials that may be imposed.
3. All covers should be secured when installed to prevent accidental displacement by wind, equipment, or workers.
4. All covers should be color coded or marked with the work “HOLE” or “COVER” to provide warning of the hazard.

XI. PROTECTION FROM FALLING OBJECTS

A. Falling object protection complies with the following provisions:

1. Hardhats should be worn.
2. Toe boards, when used, should be erected along the edge of the overhead walking/working surface for a distance sufficient to protect workers below.

3. Toe boards should be capable of withstanding, without failure, a force of at least 50 pounds applied in any downward or outward direction at any point.
 4. Toe boards should be a minimum of 3 ½ inches in vertical height with not more than ¼ inch clearance above the walking/working surface.
 5. Toe boards should be solid or have openings not over 1 inch at its greatest dimension.
- A. Where tools, equipment, or materials are piled higher than the top edge of a toe board, paneling or screening should be erected to the top of a guardrail system's top rail or midrail, for a distance sufficient to protect workers below.
 - B. Guardrail systems, used as falling object protection, should have openings small enough to prevent passage of potential falling objects.
 - C. During the performance of overhand bricklaying and related work;
 1. No materials or equipment except masonry and mortar should be stored within 4 feet of the working edge.
 2. Excess mortar, broken or scattered masonry units, and other materials and debris should be kept from the work area, by removal at regular intervals.

During performance of roofing work:

 3. Materials and equipment should not be stored within 6 feet of a roof edge unless guardrails are erected at the edge.
 4. Materials which are piled, grouped or stacked, near a roof edge should be stable and self-supporting.
 - D. Canopies, when used as falling object protection, should be strong enough to prevent collapse and prevent penetration by any objects which may fall onto the canopy.

XII. FALL PROTECTION PLAN

- A. This option is available only to employers engaged in leading edge work, precast concrete erection work, or residential construction work who can demonstrate it is infeasible or creates a greater hazard to use conventional fall protection methods. The fall protection should conform to the following provisions.
 1. Fall protection plans should be prepared and developed by a qualified person specifically for the site where leading edge work, precast concrete work, or residential construction work is being performed, Fall protection plans should be prepared and developed by a qualified person specifically for the site and the plan should be kept up to date.

2. Changes to the fall protection plan should be approved by a qualified person.
3. A copy of the fall protection plan with approved changes should be maintained at the jobsite.
4. Implementation of the fall protection plan should be under supervision of a competent person.

B. Fall protection plans should:

1. Document reasons why use of conventional fall protection systems (guardrail systems, personal fall arrest systems, or safety nets systems) are infeasible or why their use would create a greater hazard.
2. Include a written discussion of other measures to be taken to reduce or eliminate fall hazards for workers who cannot be provided with protection from conventional fall protection systems.
3. Identify each location where conventional fall protection methods cannot be used. These locations are classified as controlled access zones.
4. Include a statement that provides the name or other method of identifying each worker designated to work in controlled access zones, and no other workers should enter controlled access zones.

C. Where no other alternative measure has been implemented, the employer should implement a safety monitoring system.

D. In the event a worker falls, or some other related serious incident occurs (e.g., a near miss), the employer should investigate the circumstances of the fall or other incident to determine if the fall protection plan needs to be changed (e.g. new practices, procedures, or training) and should implement those changes to prevent similar types of falls or incidents.

XIV. HAZARD TYPES AND ACCEPTABLE FALL PROTECTION

- A. OSHA regulations require protection when workers are exposed to falls of 6 feet or more. The regulations define the specific hazards and outline acceptable ways of dealing with the hazards using the methods or devices previously discussed. The specific exposures and proper methods are given below:
1. Unprotected sides and edges
 - a. guardrail systems
 - b. Safety net systems
 - c. Personal fall arrest systems

2. Leading edge
 - d. Guardrail systems
 - e. Safety net systems
 - f. Personal fall arrest systems

- Exception: When an employer can demonstrate it is infeasible or creates a greater hazard to use these systems, the employer should develop and implement a fall protection plan.

B. Where leading edges are under construction, workers not engaged in leading edge work, are protected by a :

1. Guardrail system
2. Safety net system
3. Personal fall arrest system

If a guardrail system is chosen to provide fall protection, and a controlled access zone has already been established for leading edge work, the control line may be used in lieu of a guardrail along the edge that parallels the leading edge.

C. HOIST AREAS

1. Guardrail systems
2. Personal fall arrest systems

If guardrail systems, or portions thereof, are removed to facilitate hoisting operation (e.g. , during landing of materials), and a worker should lean through the access opening or out over the edge of the access opening , the worker should be protected from fall hazards by a personal fall arrest system.

D. HOLES

1. Personal fall arrest systems
2. Covers
3. Guardrail systems erected around such holes

Each worker on a walking/working surface should be protected from tripping in or stepping into or through holes (including skylights) by covers. Each worker on a walking/working surface should be protected from objects falling through holes (including skylights) by covers.

E. Formwork and reinforcing steel

1. Personal fall arrest systems
2. Safety net systems
3. Positioning device systems

F. Ramps, runways and other walkways

1. Guardrail systems

G. Excavations

1. When excavations are not readily seen because of plant growth or other visual barrier:

- a. Guardrail systems
- b. Fences
- c. Barricades

2. Workers at the edge of a well, pit, shaft:

- a. Guardrail systems
- b. Fences
- c. Barricades
- d. Covers

H. Dangerous Equipment

1. Guardrail systems
2. Personal fall arrest systems
3. Safety net systems

I. Overhand bricklaying and related work

1. Guardrail systems
2. Safety net systems
3. Personal fall arrest systems
4. Controlled access zone

- J. Each worker reaching more than 10 inches below the level on which they are working should be protected from falling by:

1. Guardrail system
2. Safety net system
3. Personal fall arrest system

Note: Bricklaying operations performed on scaffolds are regulated by Subpart L-Scaffolds

K. Roofing work on low-slope roofs

1. Guardrail systems
2. Safety net systems
 - a. Personal fall arrest systems, or combination of:

1. Warning line systems and guardrail system
2. Warning line system and safety net system
3. Warning line system and personal fall arrest system
4. Warning line system and safety monitoring system
5. On roofs 50-feet or less in width the use of a safety monitoring system alone.

L. Steep roofs

1. Guardrail systems with toe boards
2. Safety net systems
3. Personal fall arrest systems

M. Pre-cast concrete erection

1. Guardrail systems
2. Safety net systems
3. Personal fall arrest systems

When the employer can demonstrate it is infeasible or creates a greater hazard to use these systems, the employer should develop and implement a fall protection plan.

N. Residential construction

1. Guardrail systems
2. Safety net system
3. Personal fall arrest system

Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer should develop and implement a fall protection plan.

O. Wall openings

1. Guardrail system
2. Safety net system
3. Personal fall arrest system

P. Walking/working surfaces not otherwise addressed

1. Guardrail system
2. Safety net system
3. Personal fall arrest system

Q. Protection from falling objects

1. When workers are exposed to falling objects, hard hats and one of the following measures should be implemented:
 - a. Erect toe boards, screens or guardrail systems to prevent objects from falling from higher levels.
 - b. Erect a canopy structure and keep potential fall objects far enough from the edge of the higher level so that those objects would not go over the edge if they were accidentally displaced.
 - c. Barricade the area to which objects could fall, prohibit workers from entering the barricaded area, and keep objects that may fall far enough away from the edge of a higher level so that those objects would not go over the edge if they were accidentally displaced.

XV. TRAINING

- A. ENERGY ERECTORS, INC. should provide training for workers to enable them to recognize hazards of falling and to train them in the procedures to be followed in order to minimize these hazards.
- B. ENERGY ERECTORS, INC. should assure each worker has been trained, as necessary, by a competent person qualified in the following areas:
 1. Nature of fall hazards in the work area.
 2. Correct procedures for erecting, maintaining, disassembling, and inspecting fall protection systems to be used.
 3. Use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, controlled access zones and other protection to be used.
 4. Role of each worker in a safety monitoring system.
 5. Limitations on use of mechanical equipment during the performance of roofing work on low-sloped roofs.
 6. Correct procedures for handling and storage of equipment and materials and erection of overhead protection.

7. Role of workers in fall protection plans.

8. OSHA regulations

C. Certification of Training

1. Employee training is verified by a written training record. The written citations should state the name or other identify of workers trained, date(s) of training, and the signature of the person who conducted the training or signature of the employer. The latest training certification should be maintained by the employer.

D. Retraining

1. Whenever we have reason to believe any affected worker who has already been trained does not have the understanding and skill required we will retrain the worker.
2. Circumstances where retraining is required include, but are not limited to, situations where:
 - a. Changes in the workplace render previous training obsolete.
 - b. Changes in types of fall protection systems or equipment to be used render previous training obsolete.
 - c. Inadequacies in an affected workers knowledge or use of fall protection systems or equipment indicate the worker has not retained the requisite understanding or skill.

SECTION 9

FIRE PROTECTION

FIRE PROTECTION

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- III. Temporary Firefighting Equipment
- IV. Training
- V. Fire Brigade



FIRE PROTECTION

I. Purpose

A. There is more inherent danger from fire during the construction phase of the facility than in the completed facility with full protection in service. As construction progresses, fire hazard conditions constantly change. Accumulation of wooden forms, scaffolding, scrap lumber, packing material, paper wrapping and other refuse appear at new locations daily. In addition many ignition sources such as cutting and welding, temporary heaters, lights, etc. are present, consequently, the potential for fire is extensive. The following is a minimum to protect health and property and is intended to comply with 29 CFR 1926.150.

II. Fire Protection

A. General Requirements

1. It shall be the site supervisor responsibility to maintain the site so that all combustible materials are removed at regular intervals during the course of construction. All oily or flammable or hazardous wastes shall be separated and disposed of in containers with covers.
2. Accessibility to all available firefighting equipment shall be maintained at all times.
3. All firefighting equipment provided by ENERGY ERECTORS, INC. shall be In conspicuously located and identified as to ownership.
4. All firefighting equipment shall be periodically inspected and shall be maintained in operating condition. Defective equipment shall be immediately repaired or replaced.
5. All emergency numbers shall be displayed and all employees informed of their location.
6. Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids. Approved metal safety cans shall be used for the handling and used of flammable liquids in quantities greater than one gallon, except that highly cohesive liquids may be used and handled in original shipping containers. Original containers or approved safety cans must be used for quantities or one gallon or more.

B. Water Supply

1. As combustible materials accumulate, a temporary or permanent water supply of sufficient volume, quantity, and pressure required to properly operate fixed firefighting equipment shall be maintained. At some remote locations this may not be possible.

C. Portable Fire Fighting Equipment

1. A fire extinguisher rated not less than 2A shall be provided for each 3000 sq. ft. of protected building area. Travel distance from any point of this area to the nearest fire extinguisher shall not exceed 100 feet. See subpart F 29 CFR 1926.150 © for additional requirements.
2. A fire extinguisher, rated not less than 10B, shall be provided within 50 feet of wherever more than 5 gallons of flammable or combustible liquid or 5 pounds of flammable gas are being used on the jobsite.

III. Temporary Firefighting Equipment

- A. ENERGY ERECTORS, INC., will provide, maintain, and inspect a minimum number of portable fire extinguishers throughout the project. Equipment shall be added or deleted as construction progresses to maintain compliance with applicable fire codes.
- B. This equipment provided by ENERGY ERECTORS, INC., is for emergency use only. Additional fire extinguishers will be issued for use by fire watches or when hazards presented by work items dictate that additional precautions be taken.

IV. Training

- A. All ENERGY ERECTORS, INC. employees shall be trained in proper use of fire extinguishers. This will be accomplished through new hire orientation, safety training sessions, or toolbox safety meetings.

V. Fire Brigade

- A. Whenever agreeable the use of the host fire brigade should be utilized. If not possible or if the host requires, the site supervisor needs to know which local community fire department services his job site. Additionally, the phone number needs to be posted and all employees instructed how to contact emergency services.



SECTION 10

FLOOR AND WALL OPENINGS

RAILING AND CROSSOVERS

FLOOR AND WALL OPENINGS RAILINGS AND CROSSOVERS

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- III. Toe boards
- IV. Crossovers
- V. Stairways



FLOOR AND WALL OPENINGS, RAILING AND CROSSOVERS

I. FLOOR OPENINGS, OPEN SIDES AND HATCHWAYS

Floor openings shall be guarded by a standard railing and toe boards or cover. In general, the railing shall be provided on all exposed sides, except at entrances to stairways. Temporary floor openings shall have standard railings.

Every open-sided floor or platform, 6 feet or more above adjacent floor or ground level, shall be guarded by a standard railing, or the equivalent, on all open sides except where there is entrance to a ramp, stairway or fixed ladder.

Runways 4 feet or more high shall have standard railing on all open sides, except runways more than 18 inches wide used exclusively for special purposes may have the railing on one side omitted where operating conditions necessitate.

II. RAILINGS

A standard railing shall consist of top rail, intermediate rail and posts, and have a vertical height of approximately 42 inches from upper surface of top rail to the floor, platform, etc.

The top rail of a railing shall be smooth-surfaced, with a strength to withstand at least 200 pounds. The intermediate rail shall approximately halfway between the top rail and floor.

All stairways over 30" high or with 4 or more risers must have at least one handrail. All unprotected sides or edges must be protected with a stair rail. When the top edge of the stair rail also serves as a handrail, its top edge height must be no less than 36" nor more than 37" from the top of the stair tread, measured in a vertical line from the face of the riser below—all hand rails and top rails of stair rails must be capable of withstanding a force of 200 pounds at any point and in any direction—unprotected edges of landings must be protected by a standard guardrail (42' high, with toe board and mid-rail).

Typical drawings of railing assemblies and wall openings barricades can be found immediately after this section.

III. TOEBOARDS

Railings protecting floor openings, platforms, scaffold, etc., shall be equipped with toe boards be equipped with toe boards beneath the open side, wherever persons can pass, or there is moving machinery, or there is equipment with which falling materials could cause a hazard.

A standard toe board shall be at least 4 inches in height and may be of any substantial material either solid or open, with openings not to exceed 1 inch in greatest dimension.

III. CROSSOVERS

When employees are required to cross over excavations or pipe racks, crossovers shall be designed and installed.

IV. STAIRWAY

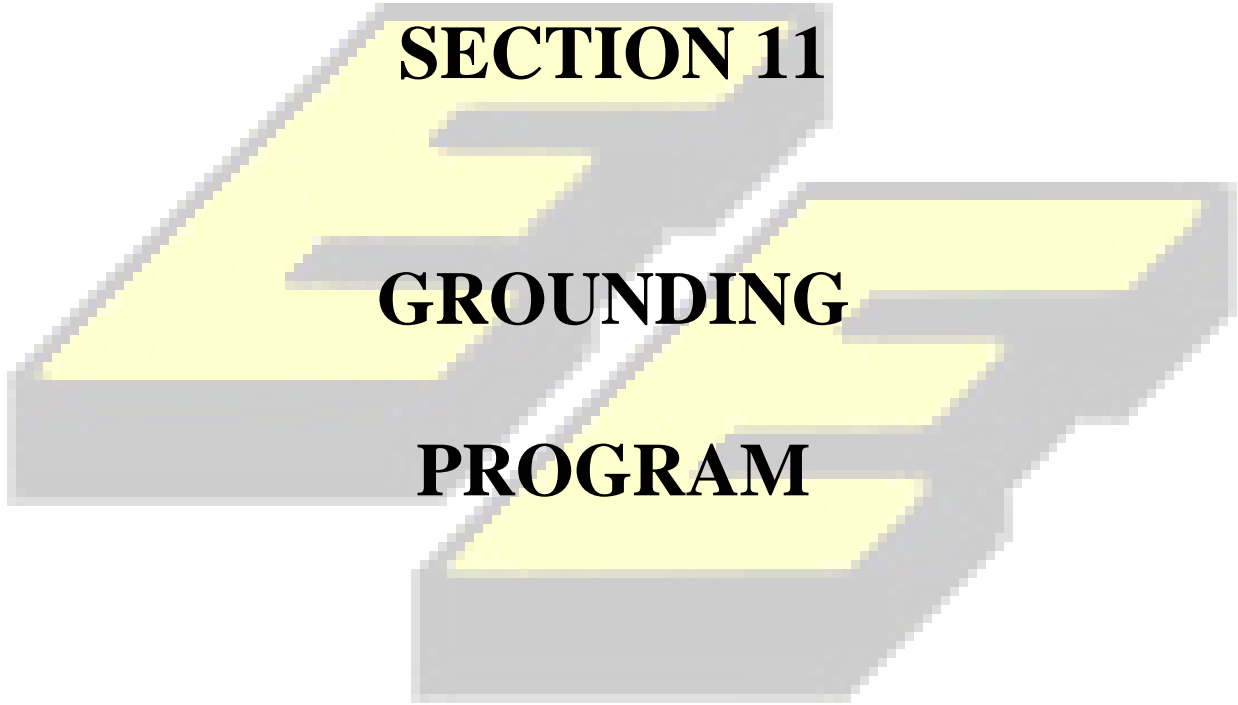
A stairway or ladder shall be provided at all personnel points of access where there is a break in elevation of 19 inches (48 cm) or more, and no ramp, runway, sloped embankment, or personnel hoist is provided.

Stairways that will not be permanent part of the structure on which construction work is being performed shall have landings of not less than 30 inches (76 cm) in the direction of travel and extend at least 22 inches (56cm) in width at every 12 feet (3.7m) or less of vertical rise.

Riser height and tread depth shall be uniform within each flight of stairs, including any foundation structure used as one or more treads of the stairs. Variations in riser height or tread depth shall not be over ¼-inch (0.6cm) in any stairway system.

Where doors or gates open directly on a stairway, a platform shall be provided, and the swing of the door shall not reduce the effective width of the platform to less than 20 inches (51 cm).

Metal pan-type treads that are not yet filled with concrete must be filled to the level of the nosing with solid material if they are to be used during construction. If this stairway is not to be used, it must be barricaded.



SECTION 11
GROUNDING
PROGRAM

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- III. Application
- IV. Installation
- V. Visual Inspection
- VI. Testing
- VII. Testing Intervals
- VIII. Test Equipment
- IX. Test Verification



Do not make available or permit the use by employees any equipment that has not passed the required tests.

VIII. TEST EQUIPMENT

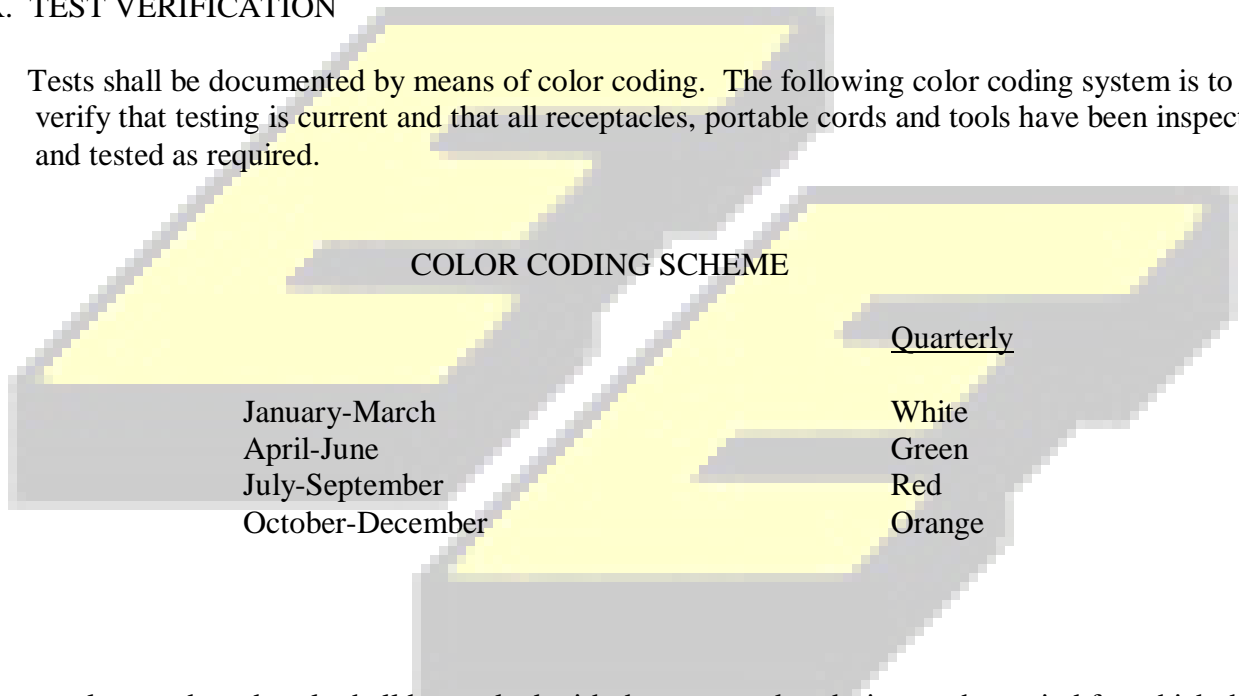
All receptacles, attachment caps and plug and receptacle or cord sets shall be tested as in the following manner:

- A. While in service with receptacle circuit tester.
- B. When not is service with a continuity tester.

This will meet the test requirements of Section 6-A and 6-B. All equipment connected by cord and plug shall be tested for ground wire continuity with a volt-OHM meter or a continuity tester.

IX. TEST VERIFICATION

Tests shall be documented by means of color coding. The following color coding system is to verify that testing is current and that all receptacles, portable cords and tools have been inspected and tested as required.



All receptacles, cords and tools shall be marked with the tape used to designate the period for which the inspections and tests were conducted

NOTE: As testing of all receptacles, cord sets and cord and plug connected equipment cannot be accomplished overnight, such tests may commence two (2) weeks prior to the end of the Quarter and continue for two (2) weeks into the following Quarter. During this interval, either color shall be deemed acceptable.

V. VISUAL INSPECTION

The employees shall be instructed that each cord set and any equipment connected by cord and plug, except cord sets and receptacles which are fixed and not exposed to damage, shall be visually inspected by the user before each day's use for external defects, such as deformed or missing pins or insulation damage and for indication of possible internal damage. Equipment found damaged or defective may not be used until repaired.

VI. TESTING

All 120 volt, single phase, 15 and 20 ampere receptacles, 120 volt equipment connected by cord and plug which are not a part of the permanent wiring of the building or structures shall be tested to assure that electrical continuity is maintained through all required equipment grounding conductors and their connectors. These tests shall be conducted as follows:

- A. All equipment grounding conductors shall be tested for continuity and shall be electrically continuous.
- B. Each receptacle, attachment cap and plug and receptacle of cord sets shall be tested for correct attachment of the equipment grounding conductor. The equipment grounding conductor shall be connected to its proper terminal.

VI. TESTING INTERVALS

All required tests are to be performed:

- A. Before the first use.
- B. Before equipment is returned to service following any repairs.
- C. Before equipment is used after any incident, which can be reasonable suspected to have caused damage (for example, when a cord set is run over) ; and
- D. At intervals not to exceed three (3) months, except that cord sets and receptacles which are fixed and not exposed to damage shall be tested at intervals not exceeding six (6)months.

I. PURPOSE

The purpose of this program is to ensure the proper installation, maintenance, inspection and testing of equipment grounding conductors on construction sites in order to minimize injuries due to electrical ground faults.

II. SCOPE

This program defines the minimum requirements to assure the installation and maintenance of equipment grounding conductors in accordance with the applicable requirements of the 1993 National Electric Code.

III. APPLICATION

- A. Location of construction site _____.
- B. Name of construction site _____.
- C. Employer complying with this program is _____ and competent person(s) (as defined in 1929.32(f) designated to implement this program is (are) _____.

IV. INSTALLATION

Equipment grounding conductors shall be installed as follows:

- A. All 120 volt, single phase, 15 and 20 ampere receptacles shall be of grounding type and connection to the equipment grounding conductor of the circuit supplying the receptacles in accordance the with the applicable requirements of Sections 210-7 © 305-2 (d) of the National Electrical Code.
- B. All 120 volt flexible cord sets (extension cords) shall have an equipment grounding conductor which shall be connected to the grounding contacts of the connectors (s) on each end of the cord.
- C. The exposed non-current-carrying metal parts of 120 volt cord and plug-connected tools and equipment that are likely to become energized shall be grounded in accordance with the applicable requirements of Sections 250-45 and 250-59 of the National Electric Code.



SECTION 12

HAZARDOUS CHEMICAL PROCEDURES

EMPLOYEE RIGHT-TO-KNOW

HAZARDOUS CHEMICAL PROCEDURE EMPLOYEE RIGHT-TO-KNOW

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- VII. Employee Information and Training
- VIII. Hazardous Non Routine Tasks
- IX. Informing Contractors
- X. Basic MSDS Index

HAZARDOUS CHEMICAL PROCEDURES EMPLOYEE RIGHT-TO-KNOW

I. PURPOSE

The purpose of this procedure is in reference to the “Code of Federal Regulations, Part 29, CFR Part 1910.1200”, commonly known as the “Employee Right to Know Law”.

II. SCOPE

The object of this law is to inform all employees as to the health and safety hazards they may encounter while working for ENERGY ERECTORS, INC. at various job sites or at the Leesburg, Florida office.

III. GENERAL

Enclosed you will find a numerical list of all chemicals you may come in contact with during your employment. These chemicals will be listed as to their chemical name and their common name, with safety data sheets to explain everything about the chemical. This list shall be updated at least yearly.

Because ENERGY ERECTORS, INC. may be working in all parts of the United States, it is recommended that you understand this procedure to protect yourself, along with any other person that may come in contact with these chemicals.

I believe the most important part of this procedure is to know the emergency first-aid treatment that must be done, at once, of any person comes in contact with these chemicals.

IV. The Emergency Treatment is as follows:

A. CHEMICAL BURNS OF THE EYE

If someone gets a chemical in the eye, put the effected eye under gently running water that is neither very hot, nor very cold, **as soon as possible!** Have the victim hold the eyelid open, or hold it open with your fingers, so the water will run into the eye for about 15 minutes. **Get immediate medical care!**

B. FIRST-AID FOR CHEMICAL BURNS OF THE SKIN

If a strong chemical gets on the skin, wash it off quickly. It may cause burns or an allergic reaction, or it may be absorbed the skin. Wash chemical burns of **ALL THICKNESSES**. Do not scrub or use soap—just flood the burn with running water. Pour water on it if there is no running water. Wash for at least five (5) minutes. Use lots of water. Take off all clothing on which a chemical has spilled, including clothing that is touching a burn. Wash **ALL** chemical burns and remove clothing from **ALL** chemical burns.

C. CHEMICAL INHALATION

1. Move the person to a well- ventilated area.
2. Administer oxygen or artificial respiration if necessary
3. Get emergency medical attention.

V. The Hazard Chemicals Communication Program has been established for ENERGY ERECTORS, INC. as follows:

A. HAZARD DETERMINATION

1. ENERGY ERECTORS, INC. will be relying on Material Safety Data Sheets from material suppliers to meet hazard determination requirements.

B. LABELING

1. The shipping and receiving supervisor will be responsible for seeing that all containers coming in are properly labeled.
2. All incoming labels shall be checked for – identity, hazard warning, and name and address of responsible party.
3. Each supervisor shall be responsible for seeing that all portable containers used in their work are labeled with identity and hazard warning.
4. Piping system shall be painted at access points and every ten (10) feet where the piping is eight (8) feet or closer to employee contact.
5. Piping shall be painted as follows:

OXYGEN.....GREEN
ACETYLENE.....ORANGE
NATURAL GAS.....BLUE

VI. MATERIAL SAFETY DATA SHEETS (MSDS)

- A. The purchasing supervisor will be responsible for compiling the master MSDS file. It will be kept in the plant office.
- B. Copies of MSDS's for all hazardous chemicals to which section employees may be exposed will be kept in a binder in the supervisor's office.

- C. MSDSs will be available for review to all employees during each work shift. Copies will be available upon request to the foreman.
- D. The purchasing supervisor shall make requests for MSDSs on all purchase orders. A file of follow up letter shall be maintained for all shipments received without MSDS.
- E. The purchasing supervisor shall provide section supervisors with the required “Right To Know” poster and postings notifying employees of new or revised MSDSs within five (5) days of receipt of a new or revised MSDS.

VII. EMPLOYEE INFORMATION AND TRAINING

- A. The project superintendent shall coordinate and maintain records of training conducted at ENERGY ERECTORS, INC.
- B. Before starting work, each new employee will attend a safety class and be informed about:
 - chemicals and their hazards in their work areas
 - how to lessen or prevent exposure to these hazardous chemicals
 - what the company has done to lessen or prevent workers’ exposure to these chemicals
 - how to read and interpret labels and MSDSs used at ENERGY ERECTORS, INC.
- C. Before any new hazardous chemical is introduced into a section, each employee will be given information in the same manner as during the safety class. The section of supervisor will be responsible for seeing that MSDSs on the new chemical are available.
- D. During scheduled safety meetings any new hazardous chemical used in the work are by ENERGY ERECTORS, INC. will be discussed. Attendance is mandatory for all employees.
- E. Notices will be posted on the employee bulletin boards that provide the location of the written hazard communication program.

VIII. HAZARDOUS NON-ROUTINE TASKS

- A. Approximately three (3) to four (4) times a year, section employees are required to do welding tasks in confined spaces (i.e. tanks) . Prior to starting work on such a space, each employee will be given information by the section foreman about hazards involved with welding activities in confined spaces.
 - This information will include:
 - specific chemical hazards
 - protective / safety measures the employee can take

- measures the company has taken to lessen the hazards including ventilation, respirators, presence of another employee and emergency procedures
- B. It is section policy that no employee will begin work in a confined space or any non-routine task without first receiving a safety briefing from he project supervisor.

IX. INFORMING CONTRACTORS

A. It is the responsibility of the purchasing supervisor to provide the contractors and their employees with the following information:

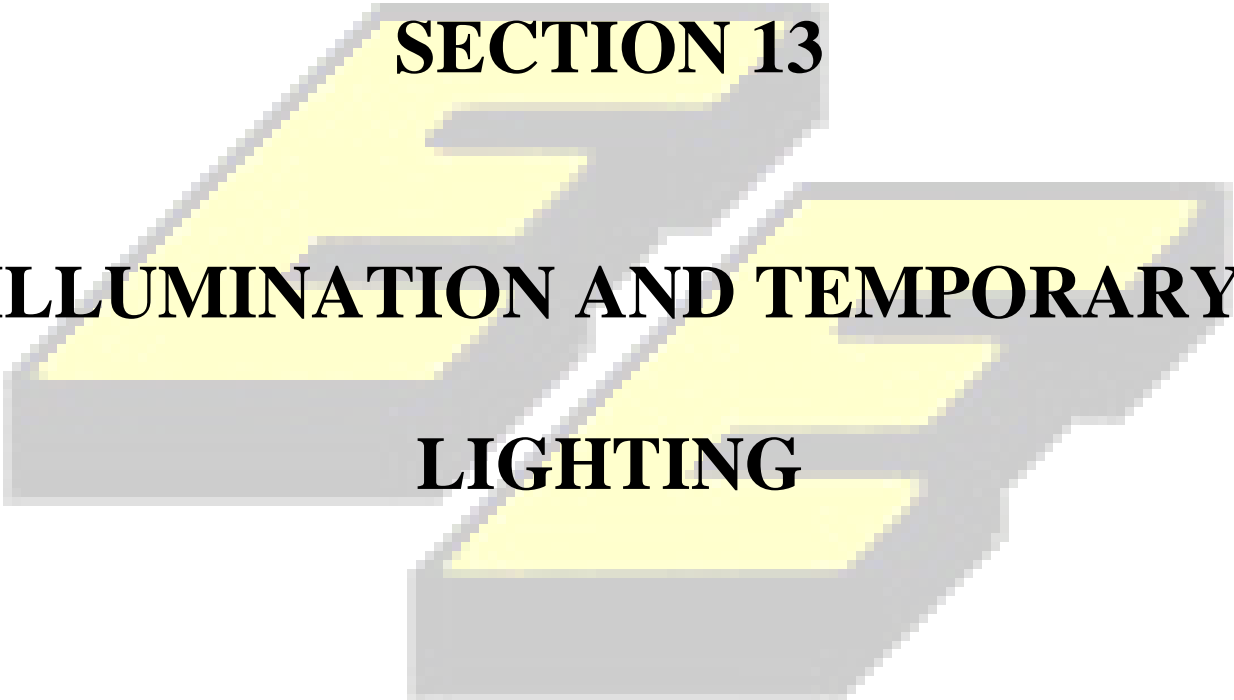
- Hazardous chemicals to which they may be exposed while on the job site
- Measures the employees may take to lessen the risks
- Steps the company has taken to lessen the risks
- MSDSs for all hazardous chemicals are on file in the plant office
- Procedures to follow if they are exposed

B. The purchasing supervisor will coordinate with the project supervisor to ensure that contractor's entering the work site.

One copy shall be posted where the employees may use this information as needed.

The attached is a list of **FIELD HAZARDOUS CHEMICALS** that may be used by ENERGY ERECTORS, INC. Further information on each hazardous chemical noted can be obtained by reviewing Material Safety Data Sheets in the office.

| # ORDER | COMMON NAME |
|---------|-----------------------------------|
| 1 | ACETYLENE |
| 2 | ARGON GAS |
| 3 | CADWELD SHOTS |
| 4 | COMPRESSED PROPANE |
| 5 | CONTACT CEMENT |
| 6 | CUTTING OIL- DARK |
| 7 | CUTTING OIL- WAX |
| 8 | JOUNT COMPOUND |
| 9 | REGULAR GASOLINE |
| 10 | UNLEADED GASOLINE |
| 11 | DIESEL FUEL |
| 12 | GO-JO SILK SCRUB HAND CLEANER |
| 13 | FIRE TECH- SYSTEM 747 |
| 14 | READY-MIXED CONCRETE (UNHARDENED) |
| 15 | PLASTIC BOND |
| 16 | RAPID TAP |
| 17 | SOLDER |
| 18 | SOLDER PASTE |
| 19 | STAINLESS STEEL WELDING ROD |
| 20 | THINNER (XYLENE) |
| 21 | WELDING ROD |
| 22 | WIRE PULLING LUBE 77 |
| 23 | MIXED ALCOHOLS IN AEROSOL CANS |
| 24 | POLYWATER HYDRASOL CABLE GEL |
| 25 | ANHYDROUS AMMONIA |
| 26 | CHLORINE |
| 27 | CHLORINE DIOXIDE |



SECTION 13
ILLUMINATION AND TEMPORARY
LIGHTING

ILLUMINATION AND TEMPORARY LIGHTING

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h. Splice Box

i. Protecting Extension Cords

j. Extension Cords

ILLUMINATION AND TEMPORARY LIGHTING

I. GENERAL

Construction areas, ramps, runways, corridors, offices, shops and storage areas shall be lighted to not less than the minimum illumination intensities as listed below per OSHA 1926.56

| <u>Foot candles</u> | <u>Area of Operation</u> |
|---------------------|--|
| 5 | General construction area lighting |
| 3 | General construction areas, concrete placement, excavation and waste areas, access ways, active storage areas, loading platforms, refueling and maintenance areas. |
| 5 | Indoors: warehouses, corridors, hallways and exit ways |
| 10 | General construction plant and shops, e.g. batch plants, mechanical and electrical equipment rooms, carpenter shops, rigging lofts and active storerooms. |

II. TEMPORARY LIGHTING AND WIRING METHODS (OSHA 1926.405)

The provisions of this paragraph do not apply to conductors which form an integral part of equipment such as motors, controllers, motor control centers and like equipment.

A. General Equipment

1. Electrical continuity of metal raceways and enclosures. Metal raceways, cable armor, and other metal enclosures for conductors shall be metallically joined together into a continuous electric conductor and shall be so connected to all boxes, fittings, and cabinets as to provide effective electrical continuity.

2. Wiring in ducts

No wiring systems of any type shall be installed in ducts used to transport dust, loose stock or flammable vapors. No wiring system of any type shall be installed in any duct used for vapor removal or in any shaft containing such ducts.

B. Temporary Wiring

1. Scope

The provisions of this section apply to temporary electrical power and lighting wiring methods, which may be of a class less than would be required for a permanent installation. Except as specifically modified in this section, all other requirements for permanent wiring shall apply to temporary wiring installations. Temporary wiring shall be removed immediate upon completion of construction or the purpose for which the wiring was installed is no longer required.

2. General Requirements for Temporary Wiring

- a. Feeders shall originate in a distribution center. The conductors shall be run as multi-conductor cord or cable assemblies or within raceways.
- b. Branch circuits shall originate in a power outlet or panel board. Conductors shall be run as multi-conductor cord or cable assemblies or shall be run in raceways. All conductors shall be protected by over-current devices of proper ampacity. No branch-circuit conductors shall be laid on the floor. Each branch circuit that supplies receptacles or fixed equipment shall contain a separate equipment grounding conductor.
- c. Receptacles shall be of the grounding type. Unless installed in a complete metallic raceway, each branch circuit shall contain a separate equipment grounding conductor, and all receptacles shall be electrically connected to the grounding conductor. Receptacles for uses other than temporary lighting shall not be installed on branch circuits which supply temporary lighting. Receptacles shall not be connected to the same ungrounded conductor of multi-wire circuits, which supply temporary lighting.
- d. Disconnecting switches or plug connectors shall be installed to permit the disconnection of all ungrounded conductors of each temporary circuit.
- e. All lamps for general illumination shall be protected from accidental contact or breakage. Metal-case sockets shall be grounded
- f. Temporary lights shall not be suspended by their electric cords unless cords and lights are designed for this means of suspension.
- g. Portable electric lighting used in wet and/or other conductive locations, as for example, drums, tanks, and vessels, shall be operated at 12 volts or less. However, 120-volt lights may be used if protected by a ground-fault circuit interrupter.
- h. A box shall be used wherever a change is made to a raceway system or a cable system which is metal clad or metal sheathed.

- i. Flexible cords and cables shall be protected from damage. Sharp corners and projections shall be avoided. Flexible cords and cables may pass through doorways and other pinch points, if protection is provided to avoid damage.
- j. Extension cord sets used with portable electric tools and appliances shall be of three-wire type and shall be designed for hard or extra-hard usage. Flexible cords used with temporary and portable lights shall be designed for hard or extra-hard usage.

Note: The National Electrical Code, ANSI/NFPA 70, in Article 400, Table 400-4, lists various types of flexible cords, some of which are noted as being designed for hard or extra-hard usage. Examples of these types of flexible cords include hard service cord (types S,ST,SO,STO) and junior hard service cord (types SJ,SJO,SJT,SJTO).





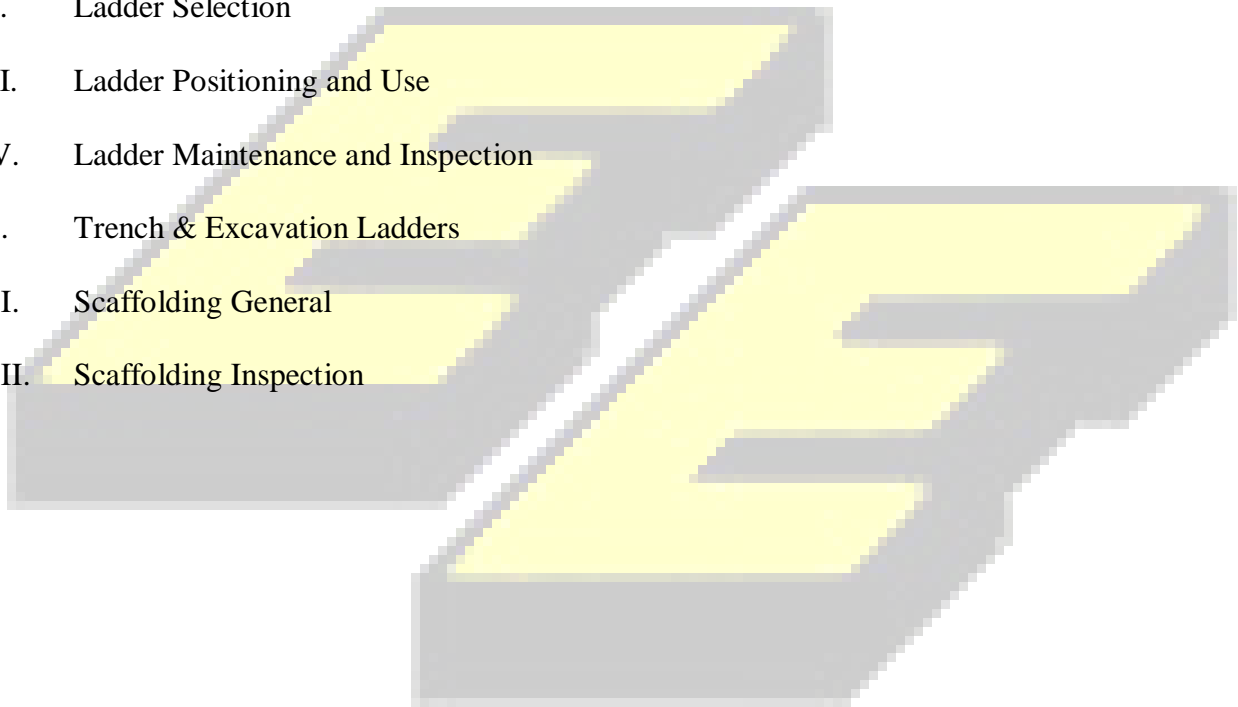
SECTION 14

LADDERS AND SCAFFOLDING

LADDERS AND SCAFFOLDING

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- III. Ladder Positioning and Use
- IV. Ladder Maintenance and Inspection
- V. Trench & Excavation Ladders
- VI. Scaffolding General
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LADDERS AND SCAFFOLDING

I. Ladders – General

A. Ladders present one of the major hazards in our field work operations and their improper use is the cause of many serious accidents. An analysis of accidents involving ladders revealed that the four principal causes of such accidents are:

1. Ascending or descending improperly.
2. Failure to secure ladder at top and/or bottom.
3. Structural failure of the ladder itself.
4. Carrying objects in hands while ascending or descending.

B. Great care must be used in the selection of the proper size and design of the ladder for the use intended, in the construction of job-built ladders, and in the maintenance and proper use of all type ladders. Job built ladders shall only be used with permission of the Safety Director.

II. Ladders – Selection

A. All wood and fiberglass ladders are to be purchased and provided in accordance with the specifications of 29 CFR 1926.1053.

B. **Straight, extension and step-type aluminum ladders are prohibited and are not to be used by any employee.**

III. Ladders – Positioning and Usage

A. All straight and extension ladders must have safety feet or be blocked to prevent displacement. When used for access to scaffolding, they shall extend 36 inches above the work platform. In all applications, the top of the ladder shall be tied off. A sketch showing the proper method of setting up an extension ladder is provided at the end of this section (See page 8).

B. If a ladder cannot be tied off, have someone hold it. (Does not apply to step ladders).

C. When step-ladders are used for heavy work, ladders should be tied off or be held by a co-worker.

D. Only ladders of proper length shall be used to perform the work. The use of makeshift extensions added to ladders is prohibited.

E. Ladders shall not be kept standing when not in use.

F. Ladders shall not be used in a horizontal position as a platform, runway, or scaffold or for uses other than those for which intended.

- G. Stepladders shall not be used as extension ladders by leaning them against equipment. All stepladders in use must be fully opened with spreaders locked. No one shall be allowed to work from the top two steps.
- H. No ladders shall be placed in walkways, driveways, doorways, etc., unless the area is barricaded or guarded.
- I. Keep both feet on the ladder rungs. Do not reach out too far or use one foot to brace on a line or adjacent equipment, Change the position of the ladder as often as necessary.
- J. Face the ladder when working from it. For short duration jobs, safety belt will be required while on the ladder if both hands are needed to do the job. Only one man is allowed on a portable ladder at any time.
- K. Both hands are needed when going up or down a ladder. Tools or materials shall not be hand-carried. A climber can lose his balance and fall or drop material on others. Tossing material is also hazardous. A hand-line shall be used to raise or lower tools and materials.
- L. The painting of wooden ladders is not permitted as paint may conceal defects in the material used in the construction of the ladders. Only clear finishes may be used.

IV. Ladders – Maintenance and Inspection

- A. Ladders should be stored in such a manner as to provide ease of access or inspection and to prevent danger of accident when withdrawing a ladder for use.
- B. Wooden ladders should be stored at location where they will not be exposed to the elements but where there is good ventilation. They shall not be stored in places subjected to excessive heat or dampness.
- C. Regular checks shall be made to insure that all ladders have tie-down ropes and that the tie-down ropes are in good condition.
- D. Before attempting to climb a ladder, workmen shall remove oil or grease from the soles of their shoes.
- E. All ladders shall be inspected prior to each use and those ladders with broken or missing rungs, split side rails, or any other defect shall not be allowed on the job site. They must be tagged “Do Not Use” and immediately removed from the work area.

V. Trench and Excavation Ladders

- A. Ladders designed and built for use in trenches and excavations shall meet all of the requirements of this Section. Special design criteria shall be utilized for trench ladders when the slope is less than 4 to 1.
- B. On slopes of 30° to 50° from horizontal, stairways shall be installed.

- C. Stairways with four or more rises or stairway heights of 30” or more shall have a handrail on at least one side.
- D. Handrail height shall be 36” from the stair tread vertically to the top of the rail.
- E. Standard rails shall be equipped with mid-rails.
- F. Handrails must be capable of withstanding a force of 200 pounds applied in any direction.
- G. Excavation ladders/stairs in which the angle of the slope is greater than 50° but less than 76° (1 ¼ but less than 4 to 1) is at the discretion of the Site Manager.

Decision is based upon:

1. Amount of traffic
2. Amount of bracing (securing).
3. Handrails
4. Type of Cleats (rings)
5. Footing

H. Slopes of less than 30° do not require stairs or ladders unless proper footing cannot be attained.

VI. Scaffolding – General

- A. All scaffold and work platforms shall be designed and constructed to meet minimum Federal and /or State Safety requirements and specifications.
- B. To avoid the use of makeshift platforms, each job should be carefully planned ahead so that all proper and necessary scaffolding will be available on the job site when required.
- C. This section covers only general scaffolding design and construction requirements.
- D. Since Federal Standards are quite detailed in their specifications for the more than two dozen types of scaffolds used in our Industry, O.S.H.A. **Construction Standard (1926.451) must be referred to for your particular job scaffolding requirements.**
- E. Scaffolds shall be provided for workmen engaged in work that cannot be done safely from the ground or from solid construction except short period work as can be done safely from properly secured ladders.
- F. When space is limited so that scaffold platforms cannot be equipped with standard platforms, standard handrails or complete decking, personnel must be made to wear full body harnesses that are tied off to independent lifelines or building structure with the use of fall arresting lanyard.

- G. All scaffolds and work platforms and all component parts shall be designed and constructed capable of supporting four times the Maximum Intended Load.
- H. All scaffolds shall be erected level and plumb, on a firm base. The poles of scaffolds shall be securely braced to prevent swaying displacement.
- I. All scaffolds or working platforms of any nature shall be securely fastened (with wire or cable) to the building, or structure or, if independent of the building, shall be braced or guyed to prevent sway.
- J. Footings for scaffolds support (minimum 2" x 10" x 10' boards or ¼" steel plate) shall be placed on a firm, rigid, smooth foundation of a nature that will prevent lateral displacement.
- K. Workmen shall not ride rolling scaffolds or attempt to move rolling scaffolds by pulling on overhead pipes or structures. All material and equipment shall be removed from platform or secured before moving scaffold. When moving rolling scaffolds, watch out for holes and overhead obstructions. Caster brakes shall be applied at all times when workmen are on scaffolds.
- L. Rope support for hanging scaffolds is prohibited where subjected to corrosive chemicals . When rope or wire is used, it must be capable of supporting at least six times the maximum load.

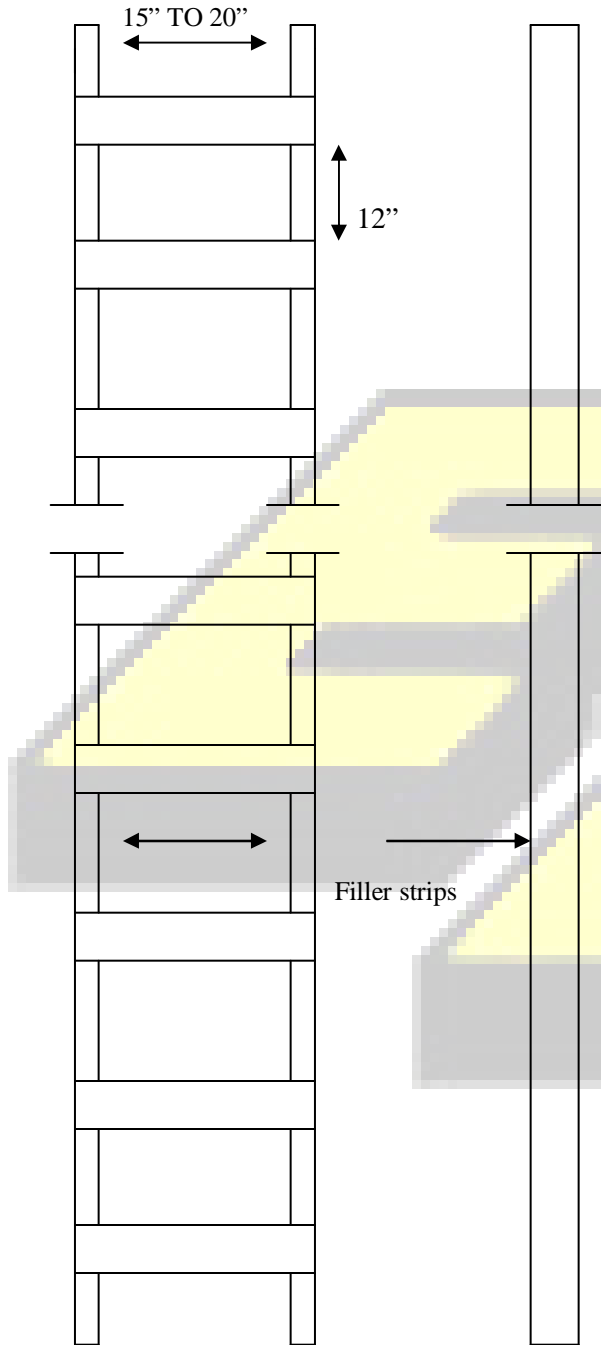
VII. Scaffolding – Inspection

- A. Scaffolds shall be inspected by a competent person before use, and daily thereafter for damaged or weakened components, loosened or pulled-out nails, unsafe guardrails, toe boards and other defects. Inspection is particularly important after high winds or job shutdowns. Upon completion of inspection the supervisor will attach a green tag denoting an OSHA approved scaffold, a yellow tag denoting a scaffold, which can only be used when certain conditions are adhered to, or a red tag denoting a scaffold unsafe to use until modifications are performed. Examples of these tags are at the end of this section. No scaffold shall be used until it has been inspected and properly tagged.
- B. All scaffolds shall be maintained in a safe condition and no scaffold shall be overloaded, altered or removed while it is in use.
- C. Any scaffold that is found damaged or weakened from any cause shall be immediately repaired and workmen shall not be allowed to use it until repairs have been completed. If repairs can not be performed immediately, the scaffolding shall be tagged unsafe and removed from service.
- D. When necessary to remove platform planks or other parts of the scaffold for the purpose of dismantling and removing equipment, the scaffold part must be replaced and secured to its original design before re-use.

- E. All lumber used in construction of scaffolds and work platforms shall be inspected before use and shall conform to specifications of construction quality stress grade, and be free of shakes, checks, splits, unsound knots or decay, etc.



T. Sketch es (single cleat job built ladder)

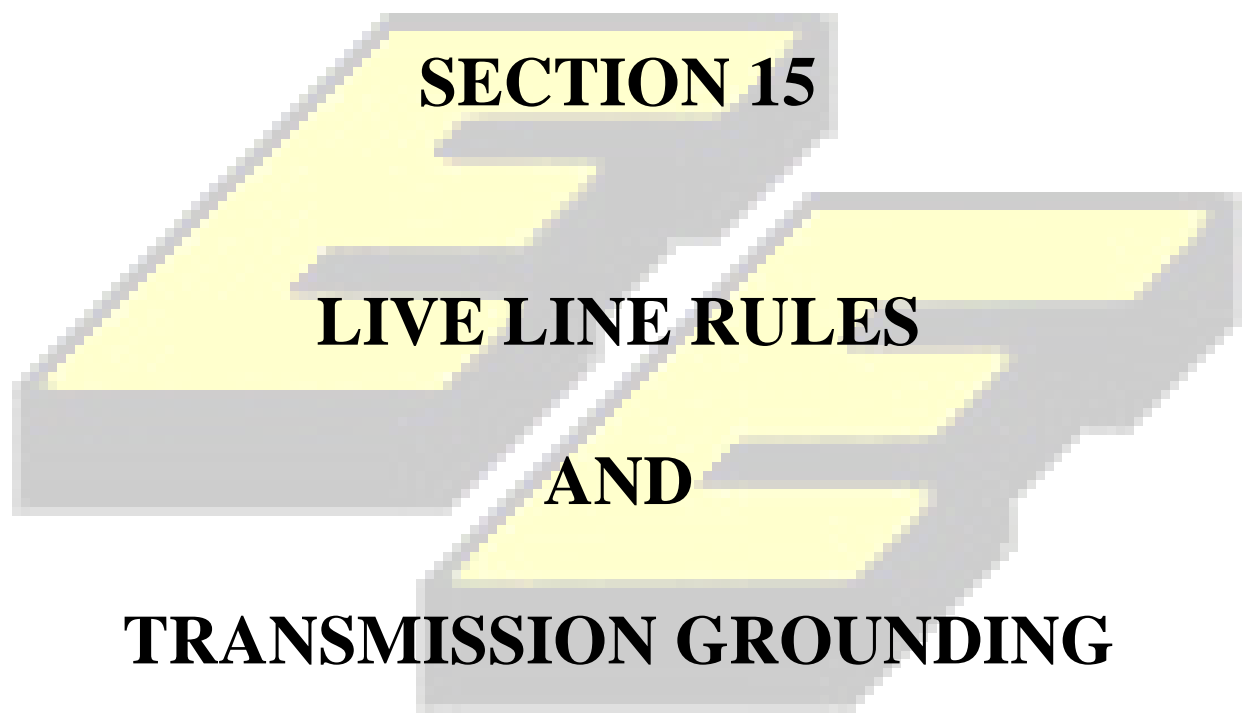


Notes

1. Length between supports (base and top landing) not to exceed 30 feet.
2. Slope of grain inside rails to be not steeper than 1 in 12. Knots of ½" or less acceptable only on wide face at least ½" from edge.
3. Cleats to be clear, straight-grained and free of knots.
4. Secure cleats to each rail with 310d common wire nails.
5. Filler strips are ¾" stock-width of rail and length to suit.

| TABLES OF MATERIAL SIZES- WOOD LADDERS | | |
|--|----------------|------------|
| WOOD SIDE RAILS- CLEAT LADDER | | |
| LENGTH OF LADDER (FT) | THICKNESS(IN) | DEPTH (IN) |
| UP TO AND INCLUDING 16 | 1-1/2 | 3-1/2 |
| 16 TO 13 | 2-1/2 | 6-1/2 |
| CLEATS | | |
| LENGTH (IN) | THICKNESS (IN) | WIDTH (IN) |
| UP TO AND INCLUDING 20 | ¾ | 3 |
| OVER 20 UP TO AND INCLUDING 30 | ¾ | 3-3/4 |

MAXIMUM LENGTH 30 FEET



SECTION 15
LIVE LINE RULES
AND
TRANSMISSION GROUNDING

LIVE LINE RULES

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I. Purpose

II. Scope

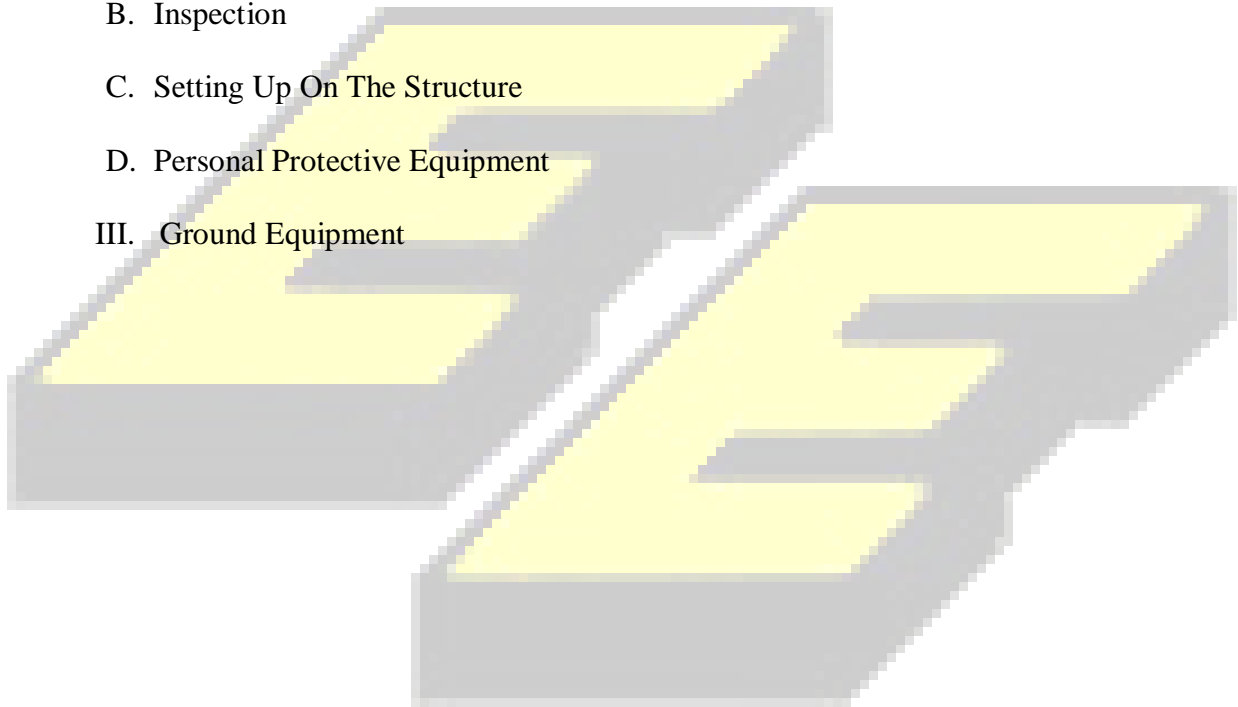
A. Planning

B. Inspection

C. Setting Up On The Structure

D. Personal Protective Equipment

III. Ground Equipment



LIVE LINE RULES

I. PURPOSE

A. This section is intended to be all inclusive, but merely a general guide to live line maintenance.

II. SCOPE

A. Planning

1. Personnel for live line maintenance shall be carefully selected. They must be mentally and physically fit, properly trained, alert, possess a stable temperament with a satisfactory background of experience.
2. A live line crew shall consist of three or more qualified men. Except where owners and local union rules permit the use of a two man line crew for limited live line maintenance.
3. Review all the details of the job. Discuss all possible hazards. Encourage questions and suggestions. Use sketches when advantageous. Be sure everyone understands every detail.
4. Live line maintenance should not be performed during inclement weather, if it can be prevented. Weather conditions should be studied so that jobs can be completed before inclement weather interferes or makes the job hazardous.
5. Select tools which have the proper voltage rating, mechanical strength and correct application for the job. Inspect all blankets, gloves and sleeves with regard to inspection dates mandated by OSHA and ENERGY ERECTORS, INC. standards.
6. Tools to be used shall be cleaned and inspected prior to each use.
7. Never lay live line tools on the ground. Surface moisture may accumulate. Tools shall be placed on a rack or tarpaulin.
8. All high voltage work shall be performed with live line tools, according to company safety rules, OSHA, N.E.C. Industry Standards, union and /or contract agreements to the extent that the document with the most stringent rules will govern.
9. Live line maintenance should not be attempted if thought to be beyond the ability of the men or the capacity of the equipment.

B. Inspection

Inspection may reveal hidden hazards.

1. Inspect the immediate working area. Inspect the pole for rot, broken tie wires, cracked or broken insulators, loose hardware, lightning damage, damaged pins or braces, damaged ground wire, bird damage or any other visible weakening of the structure. Be sure to inspect above and below ground level for pole rot. Necessary precautions must be taken should there be any apparent hazards.
2. All conductors shall be inspected for clearance of trees and buildings in the right-of-way, roads, railroads and adjacent lines.
3. The adjacent structures shall be inspected for pole damage or rot, broken insulators or ties, lightning damage, damaged ground wire, bad or loose cross arms, pins, hardware or any other possible source of trouble.
4. All conductors in the adjacent spans shall be inspected for damage from lightning, burns, gunshot or any other form of damage that could reduce the mechanical strength of the conductor. Be sure to inspect rotation arrangement.
5. Sleeves in the adjacent spans should be inspected for possible defects.
6. Special precautions must be taken when working any wire smaller than no.3 solid copper with live line tools.
7. When the preceding conditions meet with the foremen's and crew's satisfaction, work may begin on the structure.

C. Setting Up On The Structure

1. Insulate all neutrals and grounds for personal body clearance in the working area.
2. Cover all energized conductors and apparatus within reaching or falling distance except the conductor to be worked on first. Conductors may be removed from their present location and positioned in the clear, using proper tools, equipment and methods.
3. Select a safe and comfortable position from which to perform your tasks. Prior to changing position:
 - a. Review your present position
 - b. Review your intended new position.
 - c. Notify your fellow workers of your intentions to change position.

4. It is essential to maintain a safe working distance from energized lines and equipment and to avoid touching any hardware in your immediate vicinity.
5. Observe your fellow workers. Warn them of all hazards associated with working in close proximity to energized lines and/or equipment.
6. Tighten all live line tools and supports hand tight. It is not necessary to use pliers or wrenches when tightening supports on poles.
7. Whenever untying or removing conductor ties, be sure to keep the tie wire cut short so that it will not accidentally come in contact with any adjacent phase, equipment, hardware or ground.
8. Whenever removing a conductor from the insulator, be sure all pole supports are properly installed and secure and moreover, proper clearance in adjacent spans is maintained to eliminate accidental contact with adjacent phases, equipment and hardware or grounds.
9. Whenever maintenance is being performed on an angle structure, additional tools and equipment shall be used to eliminate the hazard of increased strain on the conductor, insulator, arm or structure. It is absolutely necessary to maintain control of the conductor at all times.
10. Whenever it is necessary to increase the distance between a phase conductor and a person, do not rely on link sticks (insulated stick or pole) solely for support, or protection. Stabilizing poles, spacers, etc. should also be used.
11. Do not depend on link sticks, solely, when tied to objects on the ground as a means of holding conductor away from workmen. Stabilizing poles should be used.
12. No lesser knot than a square knot, bowline, bowline on a bight, clove hitch or timber hitch shall be used when tying rope on a live line project.
13. All ropes shall be insulated from any conductor carrying over 5KV.
14. Work will be performed on only one wire at a time on the same structure.
15. While live line work is being performed on any structure, no other work shall be performed on any adjacent structure.
16. When tying or untying is being done, both top men shall have all necessary personal protection equipment.
17. Aerial ladders, buckets or platforms should only be used as a means of getting into position to do work and should never be depended upon to support line

conductors or used for insulation from any voltage.

18. Never carry or hang live line tools on your safety belt. Tools should be sent up or down on a hand line. Never hang tools on the conductor being worked upon.
19. When necessary, rope blocks shall be used on live line tools to handle weight and strains. The conductor should be moved slowly and carefully.
20. Never stand under an energized conductor that is being worked on.
21. Perform the necessary maintenance after conductors are in the clear and secure.
22. Safety is more important than time. Live line maintenance should never be hurried.
23. Never reach above your head without looking up first.
24. When any step in the work operation may cause a hazardous situation to arise, it is cause for work operations to stop so that each employee can observe or alter the procedure to protect himself or his fellow employee.

E. Personal Protective Equipment

Insulating Gloves and Sleeves

1. Insulating gloves and sleeves are to be work together when working in an energized environment.
2. Insulating gloves and sleeves of all voltages classes shall be visually inspected daily by the wearer for defects. They shall be inspected over the entire surface and shall be rolled gently between the hands to expose defects and imbedded materials. Gloves shall be air-tested before use each day and at other times if there is cause to suspect any damage. If a mechanical inflator is not available, the gloves shall be given an air test by rolling the cuff tightly toward the palm so air is entrapped inside the glove. The gloves shall be examined for punctures and defects. Puncture detection may be enhanced by listening for escaping air or, holding the glove against the worker's cheek to feel for escaping air.
3. Defective or suspected defective gloves or sleeves are to be removed from service immediately and returned to tool control for inspection and retest.
4. Insulating gloves and sleeves shall be valid for use for use for ninety (90) days from the latest date stamp. After that time they must be removed from service and returned to tool control for restarting.

5. Gloves and sleeves shall be wiped clean of any oil, grease, or other damaging substance as soon as possible.
6. Gloves and sleeves should be rinsed as necessary to remove perspiration. Excess water should be removed by being shaken out and the article then air dried.
7. Insulating gloves are to be used only with protector gloves to prevent mechanical damage. Protector gloves shall be designed for that purpose and meet ASTM standard F 696. The protector gloves shall not be used for any other purpose and kept free of oils, grease, chemicals, or other materials that may damage the protector gloves. Protector gloves that have become contaminated or damaged shall be immediately replaced.
8. The minimum clear space between the cuff of the protector glove and the rolled top of the insulating glove shall be not less than specified in the table below.

| Minimum Distance Class | Inch | MM. |
|------------------------|------|-----|
| | ½ | 13 |
| 1 | 1 | 25 |
| 2 | 2 | 51 |
| 3 | 3 | 76 |
| 4 | 4 | 102 |

9. Gloves and sleeves shall be stored in a dark, cool and dry location. The location shall be free of chemicals, oils, solvents, fumes, vapors, electrical discharges, sunlight, and ozone as practicable.
10. Gloves shall be stored in their natural shape. They may be kept inside their protector in a glove bag, box, or a container designed for that purpose. Sleeves may be loosely rolled lengthwise inside a sleeve roll up, but the best method would be a full length sleeve bag designed for that purpose.
11. Gloves and sleeves shall not be stored folded, creased, inside out, compressed, or in any manner that will cause stretching or compression. They shall be stored only in individual boxes when stored for extended periods.
12. Gloves and sleeves shall be shipped to and from the job, and to and from the test lab in individual boxes inside a shipping container.
13. It shall be the responsibility of the job superintendent to insure that the gloves, and sleeves are being maintained in a satisfactory condition by the user.

Insulating Blankets

1. The same care, respect, and visual inspection required for gloves and sleeves are also required for insulating blankets.
2. Insulating blankets are to be stored and shipped in the canisters provided.
3. Blankets are to be installed so that the blanket will not be stretched or deformed in any manner.
4. Blankets are available for use for six (6) months from the latest date stamp on the blanket. After that date they must be removed from service and returned to tool control for retesting.

Live-Line Tools

1. All live-line tools are to be wiped clean, and visually inspected daily before each use. The tools should be wiped with a chiffon silicone wiping cloth daily to preserve their dielectric properties.
2. If any defect or contamination is found that could affect the insulating quality, or the mechanical integrity of the tool, the tool is to be removed from service immediately.
3. All live-line tools are to be inspected and tested according to 29 CFR 1910.269 paragraphs (j) (2) (iii) (D) and (j) (2) (iii) (E). The tools will then be marked with a test date and will be available for use for two (2) years from that date. Tools are to be removed from service after that date and returned to tool control for inspection and retesting. Tools removed, because contamination or defect will be re-inspected and tested. The tool will then be marked with the new test date.

Ground Equipment

- A. Ground cables will be tested and marked with the test date, and they will be available for service for a maximum of One (1) year from that date. After that date they are to be returned to tool control for cleaning and retesting.



**TRANSMISSION
GROUNDING**

TRANSMISSION LINE GROUNDING

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- II. Scope



TRANSMISSION GROUNDING

I. PURPOSE

- A. This section is not intended to be all-inclusive, but merely a general guide to transmission grounding procedures.

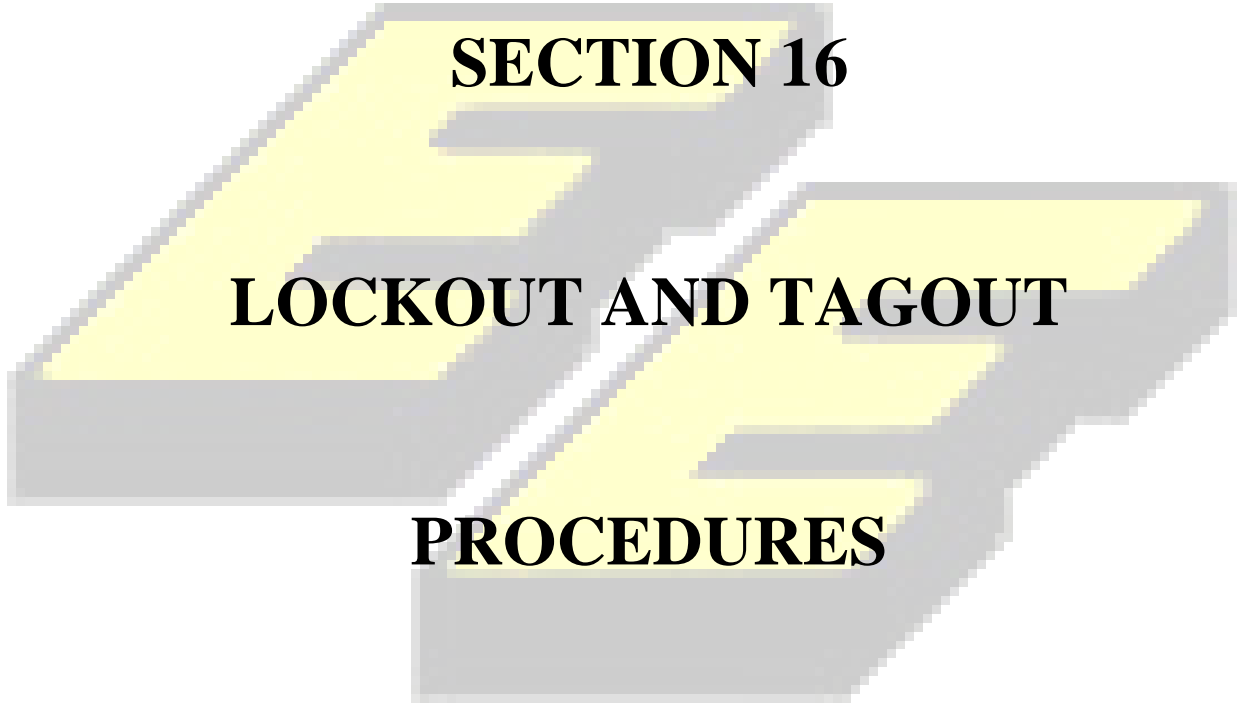
C. SCOPE

- A. Under no circumstances shall the person in charge of crews working on transmission circuits or apparatus rely or depend upon station switches for protection, but must always provide proper protective grounds. Protective grounds shall be applied to isolated lines and equipment for protection against static, lightning, accidental contact with foreign sources and mutual induction, as well as for accidental energizing from normal sources of power. It is extremely important that the installation and removal of grounds is performed with a minimum of a two-man team. The person not doing the actual task shall be watching the operation to insure the safety of his fellow employee. Likewise, any step in the work operation that may cause a hazardous situation to arise is cause for work operations to stop so that each employee can observe or alter the procedure to protect himself or his fellow employees.
- B. The ENERGY ERECTORS, INC. Supervisor will coordinate with the host company representative to secure line clearance to ensure that the circuit the circuit or piece of apparatus is properly locked out and isolated from normal energy sources. The Foreman will than inspect the tower or pole grounding system for integrity. The next step will be to inspect all tools, equipment and grounding apparatus to assure they are in proper working condition, and also that the ground cables and clamps are properly sized for the amperage capacity of the line or equipment. The Foreman will then review with working personnel proper grounding sequence and installation. The line or apparatus will be “fuzzed out” or tested with the proper test equipment prior to placing any protective grounding cables or connections.
- C. The grounding cables shall be placed on each side of the point of work and at all other points where it is deemed advisable. The grounds shall always be connected to the ground connection point first, and secondly, with the use of proper live line tools, to the phase or apparatus to be grounded. At this point, the line or apparatus is considered to be de-energized. However, when a line or bus is to be opened at the work location, both sides of the line or bus shall be grounded prior to opening the circuit.
- D. The Foremen or person in charge upon completion of his work, after assuring that all men under his supervision are clear, shall remove all protective grounds placed by him. When removing grounds, live line tools shall be used to remove the ground from the normally live apparatus (i.e.: wire, bus equipment, etc.) prior to removing the connection from the ground source. At all times

during the removal process, it is absolutely essential to maintain electrical clearance between ground wire components and normally live lines or apparatus.

- E. After the Supervisor is assured all personnel and equipment are in are in the clear, he shall report to the host company representative that the line or apparatus may be energized.





SECTION 16
LOCKOUT AND TAGOUT
PROCEDURES

LOCKOUT AND TAGOUT OF HAZARDOUS ENERGY SOURCES

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- VIII. Training Requirements
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ENERGY ERECTORS, INC
LOCKOUT AND TAGOUT OF ENERGY SOURCES

I. PURPOSE

- A. The purpose of this guideline is to protect all employees and non-employees while performing service, construction and maintenance on equipment and machinery where unexpected energizing, starting, or release or stored energy could cause serious injury, engulfment, or death.
- B. This procedure will be used unless it conflicts with a hosts contractual requirements. If this occurs than a site specific program must be written to both parties satisfaction that will insure employee safety.
- C. This guideline has been developed and implemented to comply with the Occupational Safety and Health Administration 29, CFR 1910.147 and 29, CFR 1926.417.

II. SCOPE

- 1. All employees who install, adjust, lubricate, or perform work on power driven equipment, electrical equipment, or machinery are required to lockout and tagout all energy sources to that equipment or machinery.
- 2. Failure to comply with this guideline will result in immediate disciplinary action up to and including discharge.

III. DEFINITIONS

- A. Affected Employee- An employee (other contractor, subcontractor, or owner's employee, or vendor representative) whose job requires him/her to work in an are in which service or maintenance is being performed on equipment or machinery.
- B. Authorized Employee- The key holder of a lockout padlock, the Job Supervisor, or a person who locks out or implements a tagout procedure on equipment or machinery to perform service or maintenance on that equipment or machine. An authorized employee and an affected employee may be the same person, when the authorized employee's duties also include performing maintenance or service on the equipment or machinery which must be locked and tagged out or an affected employee's duties also include the responsibility to implement a tagout or lockout procedure.

- C. Energy Isolation Device- A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following” manually operated circuit breakers; disconnect switches; manually operated switches by which the conductors of a circuit can be disconnected from all ungrounded supply conductors and in addition, no pole can be operated independently; slip gate; slip blind, line valve, blocks; and any other similar device used to block or isolate energy. Pushbuttons, electrical switch indicators, and other control-circuit type devices are not energy isolating devices.
- D. Energy Source- Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or any other type of energy.
- E. Lockout Device- A device that utilizes a positive means such as a key lock to hold an energy isolating device in the safe position and prevent the energizing or movement of equipment or machinery.
- F. Lockout- The placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the machine or equipment being controlled cannot be operated until the lockout device is removed.
- G. Normal Operation- The utilization of equipment or machinery to perform its intended function.
- H. Safety Coordinator- A responsible person assigned to coordinate activities, train employees, and maintain records required by the occupational Safety and Health Administration. This person must be delegated the authority by management to ensure compliance.
- I. Service and/or Maintenance- Workplace activities such as constructing, installing, setting-up, adjusting, checking out, testing, troubleshooting, inspecting, modifying and maintaining and/or servicing equipment or machinery. These activities include, but are not limited to: lubricating, cleaning, un-jamming, making changes or adjustments where the employee may be exposed to the unexpected energizing or start-up of the equipment or machinery, or release of hazardous energy.
- J. Start-up- Any work performed to prepare equipment or machinery for its normal machine start-up , the energy source does not have to be locked out if the person performing the service or maintenance has complete control of the energy isolating device.
- K. Job Supervisors- The Job Supervisor having responsibility for the employee(s) who are performing maintenance or service on equipment or machinery, which requires them to comply with this lockout/ tagout guideline.

- L. Tagout Device- A prominent warning device, such as a danger tag and a means of attaching it securely to an energy isolating device to indicate that the energy isolating device and the equipment or machinery being controlled may not be operated until the danger tag is removed. The persons who are authorized to perform service maintenance on the equipment or machinery must have their name clearly identified on the tag.
- M. Tagout- The placement of a danger tag on an energy isolation device in accordance with an established procedure, warning that the energy isolation device and the equipment being controlled cannot be operated until the danger tag has been removed.

III. RESPONSIBILITIES

- A. The Safety Coordinator and /or Job Supervisor having contact with employees and subcontractors involved with operations such as servicing, repairing, adjusting, lubricating, or performing other work on power driven equipment will enforce that all steps of this lockout / tagout guideline are followed. It is the ranking Supervisor's responsibility to control all facets of the lockout/ tagout program.
- B. The Safety Coordinator and Job Supervisors are responsible for conducting periodic inspections of the locking out and tagging out of energy isolating devices. To document that this guideline is being completely and correctly followed, the Safety Coordinator should keep all records of the periodic inspections with copies routed to the Corporate Safety office for permanent filing.
- C. The Safety Coordinator and/or the job Supervisors are responsible for training all employees and subcontractor employees on the lockout-tagout control steps as outlined in this procedure. The Safety Coordinator will keep all training records, with copies to the Corporate Safety Office.
- D. The Job Supervisor, or the person performing maintenance or service on the equipment or machinery, has the responsibility to inform any affected employee that maintenance or service is being performed on the equipment or machinery.
- E. Employees and subcontractors have the responsibility to follow and comply with all steps of this lockout/tagout guideline.

V. ENERGY CONTROL DEVICES

- A. Lockout and tagout devices should meet the following criteria:
 - 1. All lockout padlocks will be provided by the employer. No combination locks are to be used. Only one employee shall use each lock. Locks shall have a tag, to identify the individual lock user. The individual's lock or tag is to be removed at the end of each shift or completion of the work task. Each lock shall have one regular key held by the individual lock user. As no master key exists for padlocks

used for this procedure, an employee may be required to return after completion of his normal shift, at their expense, if the lock must be removed.

2. Lockout hasps should be constructed of material sufficient to prevent someone from removing them in an unauthorized fashion. The locks should be marked with the employee brass number or signed out by a numbering system on a sign-out sheet with the Supervisor, or by printing of the of the employees name on a tag attached to the lock.
3. Danger tags and the attachment mechanism need to be of sufficient strength so they will not be readily torn off of an energy- isolating device.
4. A tag used without a lock is not to be used, unless contractually required by the host company, and it shall be supplemented by at least one additional safety measure that provides a level of safety equivalent to that obtained by the use of a lock. Examples of additional safety measures include the removal of an isolating circuit element, blocking of a controlling switch, or opening of an extra disconnecting device.

IV. LOCKOUT/TAGOUT PROCEDURE

A. Lockout/Tagout Steps

1. Any employee or subcontractor who is required to maintain or service equipment or machinery will verify that the equipment or machinery has been properly locked and tagged out before work begins.
2. To properly lockout/tagout equipment or machinery, turn the main power disconnect switch, breaker, valve, or other energy- isolating device to the off or neutral position. Use the assigned personal padlock and hasp to ensure that, the energy source is locked out in a manner that prevents normal or by-passed energizing. A danger tag must be attached to the energy isolating device. This tag must identify the person who is authorized to lockout/tagout equipment or machinery. Each employee who is required to perform maintenance or service on equipment or machinery, must place their individual padlock and danger tag on the lockout hasp.
3. Immediately after the machinery is locked and tagged out , and before maintenance or service begins, test the energy isolating device to ensure that the controls cannot be moved to the on or active position. Push start buttons, have operator attempt to start machine remotely, test with proper equipment to establish that the energy source is removed. If there is a potential for a release or residual or stored energy such as that from gas, steam, water pressure, hydraulic, air, electrical or other type of energy, it must be locked out, released or discharged to prevent unrestricted or undesired movement of equipment or machinery.

Always check for a potential secondary power source, such as standby generators, remote control or automatic protection or starting devices.

4. When start-up operations are being performed, the employee may tagout the energy isolating device only if that employee has complete control, including visual contact, of the energy isolating device.
5. When the equipment or machinery is locked and tagged out, the Job Supervisor and the person responsible for performing the maintenance or service are required to verbally inform any affected employees that maintenance or service is being performed on the equipment or machinery.

B. If the equipment or machinery needs to be repositioned or tested, the following steps need to be taken:

1. Remove all tools, blocks, and other materials from the equipment or machine points of operation.
2. Assign one person to be the authorized employee and in control of the piece of equipment. This designated employee shall warn all affected employees and other employees in the immediate area that the equipment or machinery is going to be tested or repositioned.
3. Have each affected person who is performing maintenance or service remove their personal padlock, danger tag, and lockout hasp. Re-energize the equipment machinery.
4. Test or reposition the equipment or machinery.
5. When the testing or repositioning is complete, de-energize the main power switches, breakers, valves, or other energy isolating devices. Ensure that the lockout hasp, individual padlock(s), and danger tag(s) are replaced before the work resumes. Refer to A1 through A5.
6. Before the work resumes, re-test the energy isolating device as in Item A.3 to ensure that the controls cannot be moved to the on or active position.

C. When service or maintenance is complete and the equipment or machinery is ready to be put into operation, the following steps must be followed:

1. Remove all tools, blocks and other materials from the equipment or machine points of operation. Replace all guards, protective shields or other safety devices, which may have been removed.
2. The authorized employee shall warn all affected employees and other employees in the area that the equipment or machinery is going to be put into operation.

3. Have each person who is performing service or maintenance remove their individual padlock, danger tag, and lockout hasp.
 4. Return the main power switches, breakers, valves, or other energy isolating devices to their on or active position.
 5. Start the operation of equipment or machinery.
- D. When more than one person (group lockout/tagout) is required to perform service or maintenance on equipment or machinery, each person will attach his/her personal padlock and danger tag to the lockout hasp. Their padlock and danger tag will not be removed by any other person. The Job Supervisor is the only person authorized to remove any group lockout/tagout padlock.
- E. When service or maintenance of equipment or machinery takes longer than one work shift, the following steps will be followed:
1. When an employee leaves at the end of the shift, his/her padlock and danger tag will be removed and the employee on the next shift will re-lock and re-tag the energy isolating device with their padlock. The authorized employee who is leaving will explain all aspects of the service or maintenance being performed to the individual taking over the duties.
 2. If for some reason an employee who implements or is part of the lockout/ tagout procedure is not able to remove his/her lock at the end of the shift, the Job Supervisor is the only person authorized to remove the lock.
- F. Removing Employee Lock By Supervisor
1. The Project Superintendent may cut the lock, provided the following conditions are met:
 - a. The authorized employee cannot be contacted to return and remove the lockout padlock with his key.
 - b. The project attendance roster or brass system is checked to verify the authorized employee and all affected employees have left the site.
 - c. The affected machine or piece of equipment is inspected to assure that its function and integrity have been re-established and it is therefore in a state, which is considered ready to operate.
 - d. All guards, shields, upstream or downstream affected devices or equipment have been verified to be functionally ready to operate.

- e. Physically inspect the device to ensure no personnel are in a position to be affected by the movement or energizing of the device or equipment.
 - f. Assign an employee with radio communication to stand by the device prior to cutting the lock to ensure no one approaches the device or equipment during the cutting of the lock and re-energizing of the device or equipment.
 - g. Record all actions and the lock number and employee name in the project log book.
 - h. Cut the lock.
 - i. The Project superintendent will be required to ensure that the employee is aware that the lock or tag has been removed before he or she resumes work at that workplace. This must be done in writing, with the employee signature, to verify this warning.
- G. All Subcontractors will conform to the ENERGY ERECTORS, INC. lockout / tagout requirements.
- 1. All subcontractors who are engaged in the maintenance or service of equipment or machinery are to be informed by ENERGY ERECTORS, INC. Job Supervisor, of the steps necessary to conform to the ENERGY ERECTORS, INC. control procedures.
 - 2. Failure to follow this guideline will result in an immediate stoppage of work. The Job supervisor in charge will inform the subcontractor of the proper lockout/tagout steps to follow before work can continue.

VII. RANDOM PERIODIC INSPECTIONS

- A. The purpose of random periodic inspection is to ensure that all employees and subcontractors are correctly and completely following the steps of the lockout/tagout guideline.
- B. It is the responsibility of the Safety Coordinator and Job Supervisor to conduct periodic inspections.
- C. The periodic inspections should cover, but not be limited to the following:
 - 1. Verify that the employee(s) or subcontractor(s) performing service or maintenance on the equipment or machinery are authorized.
 - 2. Verify that all lockout/tagout equipment (padlocks, hasps, and danger tags) conform to the ENERGY ERECTORS, INC. specifications.

3. Verify that all the energy control procedural steps are followed correctly and completely.
- D. Each time the Safety Coordinator and/or Job supervisor perform a periodic inspection, the following information should be documented:
1. Date of inspection.
 2. Person (s) performing the inspection
 3. The building and specific work area (s) included in the inspection.
 4. Identify the equipment or machinery that is being locked and tagged out by machine number or location number.
 5. Identify all the employee(s) and subcontractor (s) who are required to service and maintain the equipment or machinery.

VIII. TRAINING REQUIREMENTS

- A. The Safety Coordinator and Job Supervisors are responsible for training all employees on this lockout and tagout of energy sources procedure.
- B. All full time employees will be trained and the training should include, but not be limited to:
 1. Purpose and use of the lockout and tagout of energy sources procedures.
 2. Identification of all potential energy sources.
 3. Circumstances requiring lockout/tagout and multiple lockout/tagout devices .
 4. Description of the lockout/tagout devices and how they work.
- C. All new and transferred employees will be trained, when they are assigned to a job, by their Job Supervisor.
- D. All full-time employees will be retrained when this guideline is updated.
- E. It is the responsibility of the Safety Coordinator to keep all training records.
- F. Video training tapes are available to assist in training.

IX. DISCIPLINE

- A. The indiscriminate removal of another employee's danger tag will result in immediate dismissal.
- B. The removal of another employee's padlock by other than the Job Superintendent will result in immediate dismissal.
- C. Other infractions of this procedure will result in disciplinary action up to and including dismissal at the sole discretion of the employer.
- D. If an employee has received one warning letter as a disciplinary action and is again found to be in violation of this procedure, he shall be dismissed.



SECTION 17

MATERIAL HANDLING

AND

STORAGE

MATERIAL HANDLING AND STORAGE

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MATERIAL HANDLING AND STORAGE

I. General

- A. Manual material handling, which accounts for 23% of all accidents, consists of six basic tasks.
1. Lifting
 2. Lowering
 3. Pushing
 4. Pulling
 5. Carrying
 6. Walking
- B. Makeshift handling creates disorderly field conditions, work interruptions and damage. Unnecessary confusion and distraction, which usually accompany inefficient handling methods, interfere with job site operations and result in lower quality.
- C. The three fundamental principles of good material handling procedures are:
1. Continuous flow without back-tracking
 2. Uninterrupted work scheduling
 3. Adequate storage facilities
- D. Material shall be safely piled in accessible locations. Specially designated storage areas will eliminate confusion and decrease production interruptions caused by breakage, mistakes and shortages.
- E. Where manual handling is employed, the problem of lifting requires the supervisor's attention. Complete instruction in safe lifting technique must be given. In many instances lifting can be reduced by standardizing on heights of work benches, storage bins, etc.
- F. All employees shall be instructed and supervised in safe lifting and handling methods which entail the following:
1. Inspect the load regardless of weight, handholds and size (ask for help when needed)
 2. Bend the knees; get down close to the load.
 3. Grasp the load so that it is balanced.
 4. Keep your back as straight as possible.
 5. Lift gradually using the leg muscles.
 6. Do not jerk, twist or turn.
 7. Carry the load in front.
 8. Put the load down the way it was lifted.

- G. Materials shall be segregated as to kind, size and length and placed in neat orderly piles that are safe from falling. If the piles are high, they should be stepped back as the height increases and should be stepped back as the height increases and should be arranged so as to allow passageways in storerooms and warehouses.
- H. Material stored inside buildings under construction shall not be placed within six feet of the outside of any building unless the exterior walls extend above the top of the storage pile, in which case the minimum distance shall be six feet.
- I. Clearance rules (to roadways, railroad tracks, etc.) shall be known and observed. Keeping materials and buildings 10'-0" from center line of track is a good practice.
- J. Weeds and grass in outside storage areas shall be kept under control.
- K. Storage platforms, skids, bins, shelves, etc. shall be in good repair.
- L. Stored materials shall not block access to fire-fighting equipment or exit from any building.

II. Lumber

- A. Lumber shall be stacked on solid, level sills. Cross strips or cross-piling should be used where the pile is more than four feet high.
- B. The top of each pile should be kept as level as possible when lumber is being removed.
- C. Used lumber should have all nails removed before it is piled.

III. Reinforcing Steel

- A. Reinforcing steel should be stored in separate piles according to size and length. Wooden stakes are safer for separating the piles than short pieces of steel rod.

IV. Pipe

- A. Pipe shall be stored on specially designed sills or racks or should be safety blocked to prevent rolling.
- B. When removing pipe, men should work from the end of the pile as much as possible and never climb on top of the piles.

V. Corrugated and Sheet Steel

- A. Corrugated and sheet steel shall be stacked in flat piles, with the piles not more than four feet high and spacing strips shall be placed between bundles.

VI. Brick

- A. Brick shall never be piled on uneven or soft ground but should always be stacked on planks or pallets, except where the surface is asphalt or concrete.
- B. Brick shall never be stacked for storage purposes on scaffolds or runways. This requirement does not prohibit normal supplies on bricklayer' scaffolds during actual bricklaying operations.
- C. Except when stacked in sheds, brick piles shall never be more than seven feet high.
- D. When a pile reaches a height of four feet, it shall be tapered back two inches in every foot of height above the four feet level.
- E. The pile shall be tapered back one-half block per tier above the six- foot level.
- F. The top of brick piles shall be kept level and the taper maintained during un-piling operations.

VII. Cement and Lime

- A. Bags of cement and lime shall not be piled more than ten bags high, except when stored in bins or enclosures built for such purposes.
- B. Workers handling cement and lime bags shall be required to wear goggles, gloves and clothing that fits snugly around neck and wrists.
- C. Workers shall be warned against wearing clothing that has become hard and stiff with cement. Such clothing irritates the skin and may cause serious infection.
- D. Workers shall be instructed to report any susceptibility of their skin to cement and lime burns and shall be encouraged to practice personal cleanliness.
- E. Lime shall be stored in a dry place to prevent a premature slaking action that may cause fire.

VIII. Sand, Gravel and Crushed Stone

- A. In withdrawing sand, gravel and crushed stone from stock piles, no overhanging shall be permitted to exist at any time.

- B. Material dumped against walls or partitions shall not be stored to a height that will endanger the stability of such walls or partitions.

IX. Flammable Liquid Storage

- A. Only U.L. or F.M. approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids.
- B. No more than 25 gallons of flammable or combustible liquids shall be stored in a room outside of an approved storage cabinet. Nor more than 60 gallons of flammable or 120 gallons of combustible liquids shall be stored in any one storage cabinet. No more than three storage cabinets may be located in a single storage area. Cabinets shall be posted-“Flammable-Keep Fire Away” . A minimum 20# Portable Fire Extinguisher shall be placed a maximum of 10 feet outside a room storing more than 60 gallons of flammable liquids.
- C. Inside storage rooms for flammable and combustible liquids shall be of fire-restive construction with a 2 hour rating, have self-closing fire doors at all openings, 4-inch sills or depressed floors, a ventilation system that provides a least six air changes within the room per hour, and electrical wiring and equipment approved for Class I, Division 1 locations.
- D. Storage in container outside buildings shall not exceed 1,100 gallons in any one pile or area. The storage area shall be graded to divert possible spills away from buildings or other exposures, or shall be surrounded by a curb or dike of at least 12” in height. Storage areas shall be located at least 20 feet from any building and shall be free of weeds, debris, and other combustible materials. Each pile shall be separated by a 5-foot clearance. Provision shall be made to drain off rainwater accumulations. A minimum 20-B portable fire extinguisher must be located between 25 and 75 feet of this storage area.
- E. Flammable liquids shall be kept in closed containers when not actually in use.

X. Flammable Liquid Dispensing

- A. Conspicuous and legible signs prohibiting smoking shall be posted in service and refueling areas. Fire extinguishers rated at least 20-BC shall be located between 25 and 75 feet from the refueling area. In addition:
 - 1. The area shall be located at least 25 feet from buildings and work areas.
 - 2. No open flames or other sources of ignition shall be permitted within 50 feet of the operation.
 - 3. Refueling equipment shall be grounded and bonded and be equipped with self-venting bungs and self- closing faucets.

4. The area shall be diked, and drainage provided for spills.
5. The area shall be protected from traffic and kept free of weeds, debris, etc.
6. Engines of vehicles and other combustion equipment must be shut off when being fueled. A sketch of a typical refueling area can be found immediately after this section.

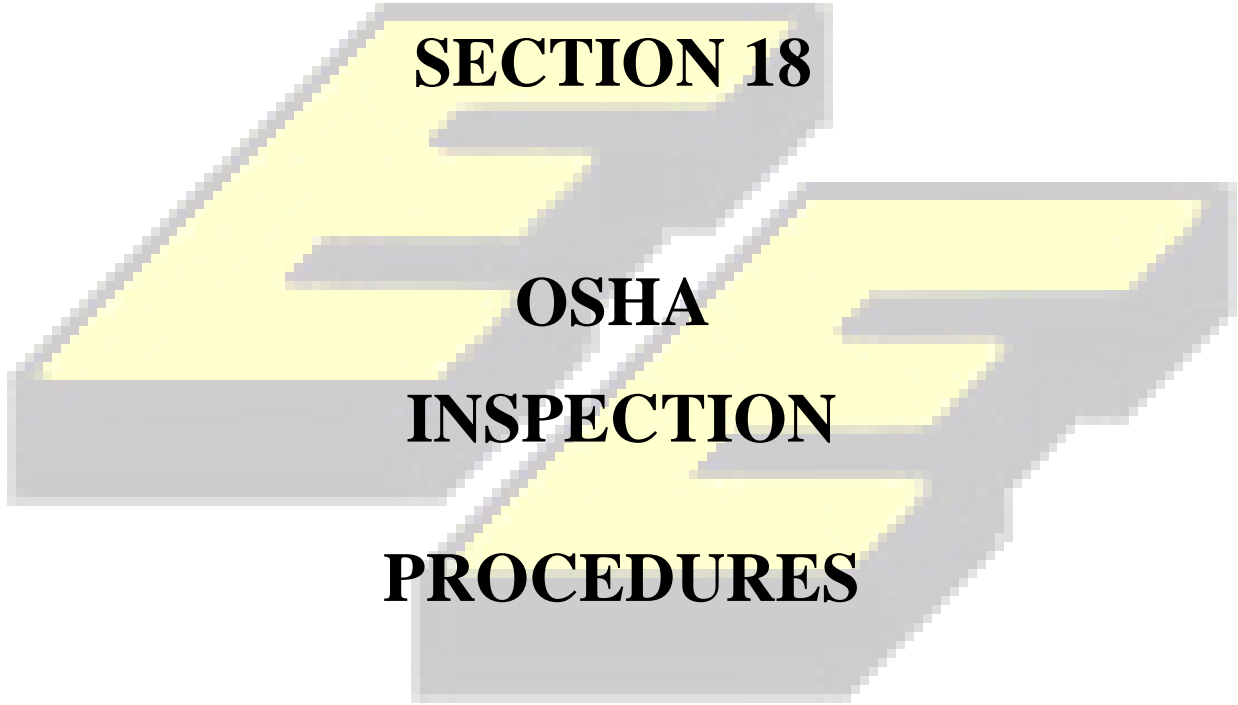
XI . Rigging (Where Required)

- A. All rigging equipment shall be used, maintained, stored, and inspected in accordance with OSHA 1926.521 and ANSI 830.9. (See ENERGY ERECTORS, INC. Safe Operating Practices for guidance, included at the end of this section).
- B. Additionally, the periodic inspection of all rigging equipment as prescribed in ANSI B30.9 shall be performed quarterly. Written records shall be maintained. All rigging equipment shall be marked by a clearly visible color- coded banding to indicate inspection has been performed.
- C. All site rigging equipment shall use the following for color coded banding of quarterly inspection:
 - 1st Quarter (Jan-Mar)- White
 - 2nd Quarter (Apr-June)- Green
 - 3rd Quarter (July-Sep)- Red
 - 4th Quarter (Oct-Dec)- Orange
- D. All written records required by this section shall be subject to review by the Safety Manager.
- E. Rigging equipment must be inspected for wear or damage prior to each use.
- F. No rope, wire rope or synthetic webbing shall be used for lifting more than its recommended safe working load.
- G. Job or shop made hooks, makeshift fasteners, etc. shall be used at anytime.
- H. When using U-bolt clips on wire rope for eye spliced, the “U” Section must be in contact with the dead end of the rope.
- I. Tag lines shall be used to control loads on all lifts with the exception of truck unloading.
- J. Proper access to loads shall be provided for rigging of loads for lifting.
- K. Riding of the headache ball or load ball is prohibited and this rule shall be strictly enforced.

- L. All rigging shall be properly stored when not in use.
- M. Certain rigging charts are included in chapter 26 of this manual.
- N. Charts should be posted in a conspicuous area of rigging issue location.

VII. Disposal Of Waste

- A. Whenever materials are dropped more than 20 feet to any exterior point, an enclosed chute shall be used.
- B. When debris is dropped through holes in the floor without the use of chutes, the area where the material is dropped shall be completely enclosed with barricades not less than 42 inches high and not less than six feet back from the projected opening. These areas will be signed- "Danger-Falling –Materials" or equivalent wording.
- C. All scrap materials shall be removed from the immediate work area as the work progresses and be piled and stacked in an orderly manner or be placed in trash containers.
- D. Solvent and oily waste rags shall be placed in covered fire resistant containers.
- E. Flammable or combustible liquids shall not be dumped in catch basins, sewers or manholes since pockets of explosive gas may accumulate.
- F. In the event there is a gas or oil spill, procedures below must be followed.
 1. Determine and correct the cause of the spill.
 2. Determine client's procedures, if applicable.
 3. Attempt to mop up with sand, rags, commercial absorbent compounds
 4. Make sure there is adequate ventilation
 5. Place contaminated materials in metal barrels/drums for proper disposal
 6. Flush the area with water, if local regulations permit
 7. Remove sources of ignition such as smoking, and shut down electrical power.
 8. Notify Subcontractor's immediate Supervisor and /or Safety Manager of spills and leaks.



SECTION 18
OSHA
INSPECTION
PROCEDURES

To: All Job Superintendents

From: Safety Director

Subject: OSHA Inspections

If your job is visited by an OSHA Inspector, we want you to follow the listed procedures:

1. Be courteous at all times.
2. Ask if the inspection can wait until the next day, thus giving the Safety Director a chance to get to the job if needed.
3. Call your Division Manager or Project Coordinator at once, along with the Safety Director, so we can be involved.
4. Your Job Safety Representative should be with the inspector at all times.
5. Remember, we have an ACTIVE SAFETY PROGRAM, so explain to the inspector some of the our programs, such as out Safety Guide Books, Respiratory Procedures, Grounding Program, Lockout Procedures, First Aid Training and the CPR Training that is available for all employees.
6. Read the enclosed information on OSHA. This could help you in many ways.
7. If you have any questions, call the Safety Director.

OSHA INSPECTION PROCEDURES

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OSHA INSPECTIONS

I. WHAT TO DO ABOUT OSHA

If an inspector knocks on your door, it is usually best to be polite and helpful, while at the same time, protecting your own interests. Remember—an OSHA inspection is not an adversary proceeding. Do not argue with the inspector no matter how absurd some things may seem; rather, point out differences so that you can later document your case should it become necessary to litigate the issue.

The Williams-Steiger Occupational Safety and Health Act of 1970 puts the burden of compliance directly on the employers. No sanctions are allowed for employees under the Act. The employer may be responsible for acts of all employees, including supervisors. Even a company President, as an employee, must be protected by the corporation, the employer.

II. VOLUNTARY GOOD-FAITH MEASURES AN EMPLOYER MAY TAKE

An employer should initiate steps to ensure safe and healthful work practices. Taking voluntary measures can help reduce fines (and sometimes insurance costs). An OSHA inspector is required to not good-faith measures in the inspection report, so that a fine may be reduced by as much as thirty percent (30%). In addition, fines can be further reduced up to ten percent (10%) for a good safety record.

An employer can convince an inspector of good-faith efforts by providing documentation, such as copies of a motion for variance or purchase orders for safety equipment.

Enacting an effective Accident Prevention program is another necessary step in attempting to comply with OSHA requirements. This involves training employees, supplying them with proper protection equipment, posting safety notices and warning labels, and establishing written and consistently enforced company safety rules. Make sure employees know and obey your rules.

II. WHAT ARE AN EMPLOYER'S RESPONSIBILITIES AND RIGHTS UNDER THE OSHA ACT?

There are two (2) OSHA primary obligations an employer must fulfill or fines may result. These are first, to keep each workplace free from recognized hazards and second, to comply with the standards and regulations of the Occupational Safety and Health Administration.

Employers also have rights under OSHA, which should be used to full advantage. The rights include:

1. The right to discipline (including the right to discharge) an employee who disobeys plant health and safety rules.
2. The right to request a variance from OSHA, and to challenge proposed or final standards.
3. The right to accompany an inspector on the plant walkaround and to have a private opening and closing conference with the inspector.

4. The right to request a confidential treatment of trade secrets, certain private documents, and other matters.
5. The right to contest OSHA citations, penalties, and abatement periods and to be notified of employee contests.
6. The right to appeal an Occupational Safety and Health Review Commission ruling to the appropriate U.S. Court of Appeals.

IV. WHAT SHOULD YOU MAKE CLEAR FROM THE OUTSET?

Once the inspector has entered your job site, you must protect yourself from the beginning.

At this time, you should include information on the inspector's identity and credentials, as well as of those accompanying the inspector. Note the inspector's special expertise, if appropriate, and the name, address, and phone number of the inspector's supervisor. Include identifying information for those you have requested to accompany you. Then as you proceed on the walkaround, note the area inspected and significant statements made. Attach materials the inspector gives you to your report.

V. THE WALKAROUND- WHAT IS MOST IMPORTANT TO REMEMBER ON A WALKAROUND?

The most important thing to remember on the walkaround is to point out where you voluntarily took immediate steps to correct any hazard since the inspector must record those actions as evidence of your good-faith. Do not point out conditions you knew or thought were hazardous because those statements or actions maybe used against you later.

Once a violation is spotted, abate it immediately if you can. If you cannot abate, politely point out what steps you took, or tried to take, to abate the hazard. You might show the inspector for example, letters you wrote requesting special equipment, or warning posters, or special directions you gave employees.

VI. WHAT CAN AN INSPECTOR DO ON A WALKAROUND?

The inspector cannot make take recordings of conversations, without special authorization, but can do the following: take photographs, take environmental samples, question employees and put their statements in writing. If there is a factual or legal dispute, respond to questions from employees (but not those related to citations or penalties), record with description, diagrams, etc., alleged violations on OSHA forms, inspect records which OSHA requires to be kept, check posting of required materials, and determine route and duration of inspection as long as there is no unreasonable interference with work.

VII. WHAT TO DO BEFORE AN INSPECTION

All employers covered by the OSHA Act are presently held responsible at least for the following:

1. Conducting self-inspections to determine hazards, correcting them, and disciplining employees who violate safety and health rules.
2. Keeping the proper records for the specified periods of time.
3. Posting the proper documents.
4. Providing precautions, training, engineering controls, and personal safety equipment for employees.
5. Reporting major accidents.
6. Avoiding discrimination against an employee for asserting safety and health rights provided under the Act.
7. Keeping current with OSHA standards and regulations.
8. Keeping the workplace free from recognized hazards, which are not covered by OSHA standards.

VIII. WHAT CAN YOU DO ABOUT NEGLIGENT EMPLOYEES?

OSHA can only fine an employer, not an employee. Although it is the employer's duty to enforce company safety rules on the job, in certain situations, the Occupational Safety and Health Review Commission has decided to absolve employers from responsibility.

To absolve an employer from liability, the Commission, or the court, must find two things: first, that the accident was a direct result of the employee's (or co-worker's) negligence and second, that the accident was an unforeseeable error, something the employer could not reasonable have foreseen. The Commission may take into consideration the diligent precautions taken by the employer or supervisor.

IX. WHAT CAN YOU DO ABOUT DISOBEDIENT EMPLOYEES?

You and your supervisors are expected to enforce company safety rules. If an employee consistently refuses to comply with accident prevention rules, especially when a serious accident could occur, you should take measures to protect yourself from OSHA liability. A frequently enforced company rule that safety violations are punishable by reprimand for the first offense, and by discharge for a second offense, has been supported by Commission.

X. WHAT OSHA RECORDS MUST YOU KEEP?

All non-exempt employers are required to keep and retain the following OSHA records for five years, not counting the year to which they relate.

1. The OSHA log and summary (OSHA 200) which keeps running totals of all injuries resulting in loss of motion or work time, transfer, or medical treatment other than first aid.
2. The supplementary record (OSHA 101) or, if it is identical in your locale, the appropriate Worker's Compensation or other form, which gives further details on injuries noted in the log itself.
3. The OSHA log and summary (OSHA 200) which keeps running totals of all injuries resulting in loss of motion or work time, transfer, or medical treatment other than first aid.
4. The supplementary record (OSHA 101) or, if it is identical in your locale, the appropriate Worker's Compensation or other form, which gives further details on injuries noted in the log itself.

Entries on the records should be recorded within six days of the injury or illness and should be initialed by the person responsible or accuracy. That person must also sign the bottom of the form when annual totals are compiled.

The records should be available in each establishment having a separate work activity. They must be available without delay and at reasonable times for inspection and copying by the Department of Labor, the Department of Health, Education, and Welfare, and by states having their own OSHA plans.

XI. AREN'T THERE CERTAIN OSHA POSTING REQUIREMENTS?

All employers covered by OSHA are required to prominently post at each establishment or send individual notices of the following:

1. The OSHA poster entitled, "Job Safety and Health Protection" (OSHA 2203), which informs employees of their rights and obligations under OSHA.
2. The anonymous half of the OSHA log and summary (OSHA 200) behind the fold line, after being signed to certify that the annual totals are accurate; but posting is only necessary for a one month period (from February 1 to March 1) of the following year.
3. A notice of imminent danger (OSHA 8) if OSHA finds such a danger and it is not corrected at the time.

Voluntary posting of other safety and health related materials or warnings may be viewed as evidence of good-faith by the inspector.

XII. DO YOU HAVE TO REPORT CERTAIN ACCIDENTS TO OSHA?

Employers must report any work related accident to OSHA within eight hours of its occurrence if it results in a death or causes the hospitalization of three employees or more. Report this to the Company Safety Director at once.

XIII. DOES THE INSPECTOR (COMPLIANCE OFFICER) NEED A WARRANT?

Recently, the U.S. Supreme Court ruled in the Marshall V. Barlows, Inc. case that, if the employer makes a search warrant demand, OSHA must obtain a warrant before conducting an inspection. A search warrant is a written document stating a given name, address, and area to be searched. It must be signed by a judge or magistrate on the basis of probable cause to suspect that a violation exists.

In deciding whether or not to request a warrant, each employer must look carefully at the facts of the particular case. Reasons to demand a warrant might involve improper procedures on the part of OSHA, lack of probable cause, or inaccessibility of necessary personnel. On the other hand, certain inspectors, albeit wrongly, may retaliate against an employer if a warrant is demanded.

XIV. DOES THE INSPECTOR NEED TO SHOW CREDENTIALS?

Even in states where a search warrant is not necessary, an OSHA compliance officer (inspector) must present credentials at the door before stepping inside. You or your agent in charge should politely request to see his or her credentials immediately. Proper U.S. Department of Labor credentials for an inspector have his or her photograph and a serial number that can be verified by phoning the nearest OSHA office.

XV. WHAT HAPPENS IF YOU ARE NOT PRESENT WHEN THE INSPECTOR ARRIVES?

The inspector who follows proper procedures will ask to see the owner, operator, or agent in charge. If one of them does not appear within a reasonable time, the inspector may consider a given employee to be in charge. Courts have ruled that an inspection may still be conducted if no employer representative is found in a reasonable time. It is, therefore, best to have a hierarchy established beforehand for these purposes. Each "agent in charge" should know what to do when the inspector arrives and whom to contact for assistance.

XVI. WHEN CAN AN INSPECTOR ARRIVE?

If the inspector has not arrived during normal working hours or other reasonable time, you or your representative can ask the inspector to come back at a more appropriate time. An inspector cannot arrive at odd hours without approval from the area director. In cases of doubt, ask to see documentation of such approval.

XVII. AT THE OPENING CONFERENCE WHAT INFORMATION MUST THE INSPECTOR SHARE?

Before beginning the tour, the inspector and you or your representative have an informal discussion. You should request that it be held in a private area. The inspector states the purpose of an inspection, which is to discover whether the employer is complying with OSHA standards and regulations. The inspector explains what records will be reviewed and may ask you permission to see additional records.

The inspector is required to furnish you with an explanation of OSHA provisions and copies of the law, as well as standards and regulations, which apply to you.

XVIII. WHAT CAN THE EMPLOYER OR EMPLOYER'S REPRESENTATIVE DO ON A WALKAROUND?

1. Take photographs similar to those taken by the inspector, but which may show a different angle or perspective more beneficial to the employer.
2. Take environmental samples, both as a check and to determine differences.
3. Ask employees further questions. But it is not wise to attempt to a cross-examination; a simple clarification or explanation may do.
4. Record employee questions and answers to point out differences or additions.
5. Record descriptions, diagrams, etc. that the inspector makes on alleged violations and record differences.
6. Attach further records, not required by OSHA, to the employer's report that might help.

XIX. WHAT IS THE PURPOSE OF THE CLOSING CONFERENCE?

This is time when you or your representative can meet along with the inspector to summarize, amplify, point out details, and generally conclude the inspection. It is best to provide a private place for this conference. It is here where the inspector completes his or her records, which will later result in recommendations for citations and abatement periods.

In the conference, the inspector tells you what he or she feels to be violations, indicating what standards have been violated. Copies of those standards should be left with you, and you should familiarize yourself with them, if you have not already done so, before the inspector leaves.

OSHA inspectors cannot ask for penalty payments or receive gratuities. The inspector will also ask you for estimates of cost of abatement and the time in which you could reasonably be required to abate.

XX. EMPLOYER'S CHECKLIST FOR A BASIC CLOSING CONFERENCE.

Request appropriate information from the inspector so that you can properly comply, such as:

1. How you can temporarily and permanently abate (the inspector is not required to do this, but can help) .
2. Could the inspector explain the standards, the general requirements, and how they apply to your business.

Point out the extenuating circumstances of your particular case, such as:

1. The “deminimus” – inconsequential—aspects of a hazard, or the “nit-picking” nature of it.
2. The abatement efforts already undertaken, supported if possible by documents.
3. Conflicting consultation advise, other statutes, or agency requirements.
4. Your previously clean safety history, if appropriate.
5. Any other relevant information, such as employee negligence, balancing safety hazards, inconsequential deviations, etc.

Do not say, provide, or do anything which, might hurt your case. Do not argue with the inspector, or make frivolous statements. In certain situations, the inspector can be used as a witness in private litigation. Even if the inspector makes a mistake, simply point it out politely, unless the mistake is a condition to inspection, such as failure to present credentials.

XXI. IMMEDIATELY AFTER CLOSING CONFERENCE

After the inspector leaves, finish your report, attach pertinent materials, and distribute copies to appropriate personnel. You may want to keep a list of persons designated for this purpose.

XXII. WHAT SHOULD YOU DO FIRST UPON RECEIVING A CITATION OR NOTICE?

Send it to the company Safety Director within twenty-four (24) hours.

XXIII. WHAT DOES OSHA HAVE TO PROVE TO ESTABLISH A VIOLATION?

If the alleged violation is non-serious, OSHA has to prove at least that there was a hazard and that the employees, or employees of another under your control, were exposed to the hazard. In some multi-employer worksite situations, an employer can be held responsible when he or she has control of a hazard to which employees of another employer are exposed.

If the violation is serious (and sometimes, if it is non-serious), OSHA must also prove that the employer had knowledge of the hazard or that a “reasonable prudent employer exercising reasonable diligence” would have know of the hazard. The knowledge of a Supervisor may be imputed to the employer.

XXIV. HOW MUCH CAN YOU BE FINED FOR EACH VIOLATION?

OSHA proposes penalties, but it does not make them final. The penalties become final if they are not contested within the fifteen (15) day period. If a contest is made, OSHA will follow OSHA's penalty scale, but it does specifically consider good faith, business size, and previous history of violations. Penalties can be raised or lowered on appeal.

Willful violation conviction resulting in employee death - up to a seventy thousand dollar (\$70,000) fine, and six (6) months imprisonment. Penalties are doubles upon a second conviction. These cases are not tried before the Review Commission, but in a U.S. District Court.

General duty violations – penalties depend on whether inspectors think the violations fit in the serious, willful, or repeated categories.

Imminent danger violations – appropriate serious, willful, or repeated penalties, No abatement credits.

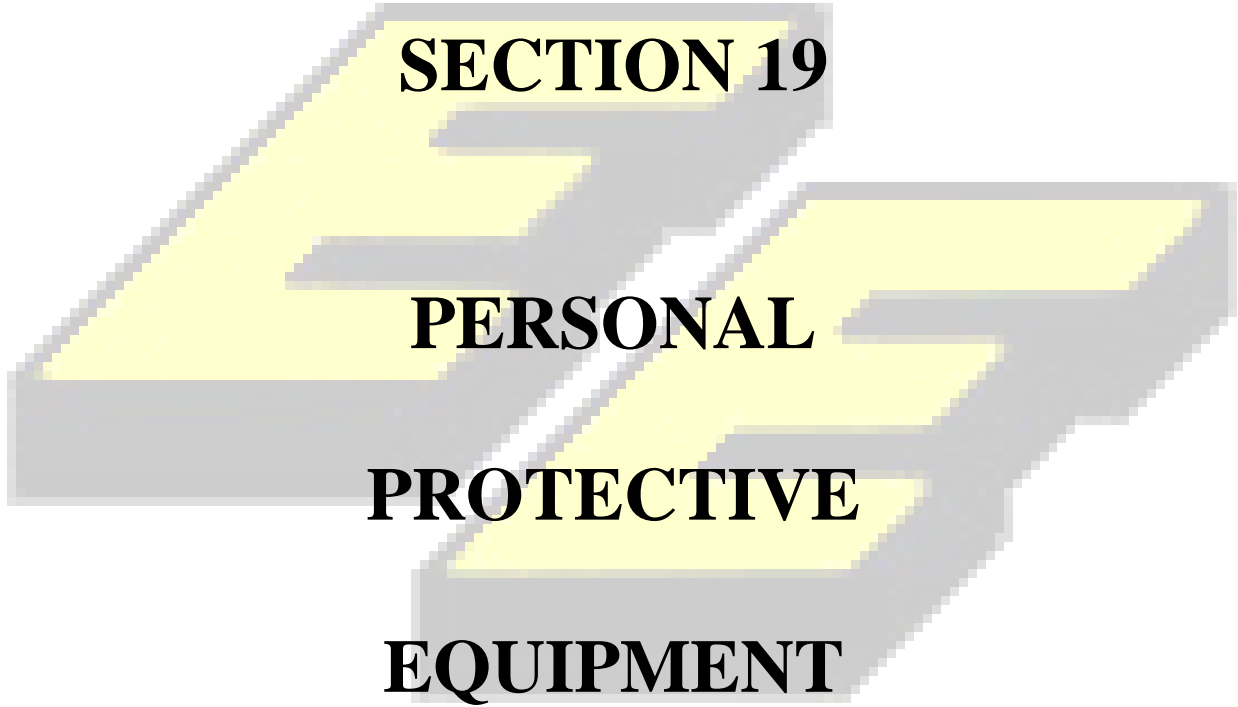
Failure to abate – up to one thousand dollars (1,000) for each calendar day the violation continues unabated.

Failure to keep records and reports- failure to keep each log and summary is one hundred dollars (\$100); failure to report accidents is four hundred dollars (\$400); for a total up to on one thousand dollars(\$1,000) adjustable for each violation. An employer may also, however, be cited for failure to post these records, in which case, a higher penalty figure will be picked.

XXV. WHAT DOES OSHA CONSIDER IN ITS DETERMINATION OF GOOD-FAITH?

The OSHA Field Operations Manual, which guides inspectors, includes the following factors to be considered in an evaluation of good faith:

1. Degree of employer health and safety knowledge especially in regards to effective monitoring, training, supervision and record keeping.
2. Protection efforts made, even if inadequate.
3. Overall workplace conditions in regards to hazard control and elimination.
4. Extent to which serious injuries or illnesses were prevented.
5. Good-faith is important because a reduction of as much as thirty percent (30%) may be allowed on a later fine if the inspector finds good-faith.



SECTION 19
PERSONAL
PROTECTIVE
EQUIPMENT

PERSONAL PROTECTIVE EQUIPMENT

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- V. Fall Protection
- VI. Hearing Protection
- VII. Working Over or Near Water
- VIII. Fire Resistant Apparel



PERSONAL PROTECTIVE EQUIPMENT

I. PURPOSE

- A. Personal protective equipment is designated and provided by ENERGY ERECTORS, INC. to interpose an effective barrier between a person and potentially dangerous objects, substances, processes, etc.
- B. When the Owner, Federal, State or Local Occupational Safety and Health Standards require and/or the ENERGY ERECTORS, INC. Safety Manual dictate protective equipment, the use of such equipment is absolutely mandatory and not open to discussion.
- C. The Safety Office shall monitor/evaluate the use and effectiveness of all personal protective equipment and recommend improvements to the Project Superintendent where indicated.

II. BASIC PERSONAL PROTECTIVE EQUIPMENT

- A. It is the responsibility of ENERGY ERECTORS, INC. to ensure that the following personal protective equipment is available prior to the start of construction activities:
 - 1. Supply of hard hats.
 - 2. Fall protection systems when elevated work is part of the contract.
 - 3. Respiratory protective equipment as dictated by hazard.
 - 4. Dust masks.
 - 5. Non-prescription protective eyewear.
 - 6. Hearing protectors.
 - 7. Foot guards when required by the work activity e.g., compacting, jack hammering, etc.
 - 8. Cutting goggles if cutting/burning operations are anticipated.
 - 9. Welding hoods and lens.
 - 10. Welding gloves.
 - 11. Welding jackets and sleeves.
 - 12. Full face shields (for operations producing flying chips, particles or sparks).

13. Rubber boots, gloves, etc. (for concrete placing operations, etc.)
14. All rubber boots, gloves, sleeves, gaff guards, line hose, blankets, and any other item that may be necessary to perform live electrical maintenance.

B. The Project Superintendent on each job site shall develop a method of ensuring the following for all Personal Protective Equipment while on the job site.

1. Proper storage and adequate shelf stock.
2. Proper sanitizing methods and facilities.
3. Provide training for the care and protection of all Personal Protective Equipment.

III. PROTECTIVE HEADGEAR AND EYE PROTECTION

A. Employees, visitors, etc. entering the construction area will be required to wear protective headgear as specified in OSHA Standards. The hard hat will be worn with the bill forward except for those designed to be worn backward, (such as welders). (“Bump caps” will not be allowed). The hard hat will have no other stickers, markings or modifications except those approved by ENERGY ERECTORS, INC.

1. Nothing will be worn under the hard hat except for items specifically manufactured to work with the hard hat suspension system.

B. As a minimum, approved safety glasses with side shields must be worn by all personnel in the field. Also employees exposed to potential eye and face injury from other physical, chemical, or radiation agents shall be furnished and will be required to use additional approved eye and face protective equipment. Eye and face protective equipment shall meet the requirements specified by ANSI Z87.1.

Face and eye protection shall be kept clean and in good repair. The use of this type of equipment with structural or optical defects shall be prohibited.

Employees whose vision requires the use of corrective lenses shall be protected by goggles or spectacles of one of the following types:

1. Employee provided spectacles where corrective lenses provide adequate protection, with the side shields and meet ANSI specification Z87.1.
2. Goggles or approved over the glass protectors that can be worn over non-conforming corrective spectacles without disturbing the adjustment of the spectacles.
3. Goggles that incorporate room for corrective lenses behind the protective lenses.

C. Welding and cutting operations present a serious hazard to employees' eyes and must be treated accordingly. Eye and face protection as outlined below shall be provided by ENERGY ERECTORS, INC.

1. Approved welding helmets shall be used during all welding or arc cutting operations.
2. Goggles or other suitable eye protection shall be used during all welding or oxygen cutting operations.
3. All operators and attendants of resistance welding or resistance brazing equipment shall use transparent shields or goggles, depending on the particular job, to protect their faces or eyes as required.
4. Helmets shall be made of a material which is an insulator for heat and electricity. Helmets, shields and goggles shall not be readily flammable and shall be capable of sterilization.
5. Helmets shall be arranged to protect the face, neck and ears from direct radiant energy from the arc.
6. Helmets shall be provided with window lenses and filter cover plates designed for easy removal.
7. All parts shall be constructed of a material that , will not readily corrode or discolor the skin.
8. Goggles shall be ventilated to prevent fogging of the lenses as much as practical.
9. Cover lenses or plates shall be provided to protect each helmet, hand shield or goggle filter lens or plate.
10. All glass for lenses and cover plate shall be tempered, substantially free from strain, air bubbles, waves and other flaws. Except when a lens is ground to provide proper optical correction for defective vision, the front and rear surfaces of lenses and windows shall be smooth and parallel.
11. Lenses shall bear some permanent distinctive marking by which the source and shade may be readily identified.
12. Helmets and goggles shall be well maintained. They should not be transferred from one employee to another without being disinfected.
13. A guide for selection of filter lens shade numbers is provided at the end of this section. These recommendations may be varied to suit individual needs.

D. Laser Protection

1. Employees whose work assignment requires exposure to laser radiation shall wear safety goggles, which will protect the eyes for the specific wavelength of the laser and be of optical density (O.D.) adequate for the energy involved.
2. All protective goggles shall bear a label identifying the following criteria:
 - a. The laser wavelengths for which it is intended.
 - b. The optical density (O.D) of the wavelength
 - c. The visible light transmission

When the use of eye and/or ear protection is required, the use of such protection shall be mandatory. Repeated failure to use such personal protective equipment will result in disciplinary action including termination.

IV. FOOT PROTECTION

Employees are required to wear sturdy work boots that will provide adequate protection against injury to the feet and ankle.

When work boots will not provide sufficient protection, ENERGY ERECTORS, INC. will provide, and the employee will be required to wear, approved foot guards, e.g., strap on metatarsal guards.

Although not mandatory, employees should be encouraged to purchase and wear boots with steel toes, sole penetrating protection, and ankle protection.

Tennis shoes, running shoes, light canvas shoes, etc., are not authorized for wear in construction areas.

V. SAFETY BELTS, SAFETY HARNESSSES, LANYARDS, LIFE LINES, AND SAFETY NETS

Fall protection, as required by OSHA and the ENERGY ERECTORS, INC. Safety Manual, shall be provided by ENERGY ERECTORS, INC. for our employees.

Any employee whose work places him outside any area otherwise protected by finished or temporary handrails or where their work is to be performed on single or two-point suspension scaffolds or any other working surface where they may be subject to a fall greater than 6' shall wear full body safety harnesses, with shock absorbing lanyards, and lifelines, where required.

At the time of hire and during safety meetings, each employee shall be made aware of his obligation to wear and use safety belts, safety harnesses, and associated equipment when work tasks dictate. This policy will be adhered to strictly and any employee found not to be using the required fall protection equipment will be subject to disciplinary action up to and including termination.

Lifelines, safety belts, safety harnesses, and lanyards shall be used only for employee safeguarding. When any of these are actually subject to in-service loading (as distinguished from static load testing), they shall be immediately removed from service and shall not be used again for employee safeguarding.

Lifelines shall be secured above the point of operation to an anchorage or structural member capable of supporting a minimum dead weight of 5,400 pounds minimum.

All safety bets, safety harnesses, and lanyard hardware shall be drop forged or pressed steel, or cadmium plated. Surfaces shall be smooth and free of sharp edges.

All safety belts, safety harnesses, and lanyard hardware, except rivets, shall be capable, of withstanding a tensile loading of 4,000 pounds without cracking, breaking or taking a permanent deformation.

All lifelines, safety belts, safety harnesses, lanyards and associated hardware shall be inspected before and after each use for wear and possible damage due to use. Additionally, lifelines, safety belts, safety harnesses, lanyards and associated hardware kept in storage shall be periodically inspected to ensure that they have not been subject to damage, deterioration due to storage conditions and other factors that may reduce their strength characteristics.

VI. HEARING PROTECTION

- A. Employees shall not be exposed to noise in excess of the Occupational Exposure Limits set forth by the OSHA Standards. This may be accomplished (in order of preference) by:
 1. Instituting Engineering Controls.
 2. Work Practices/Administrative Control.
 3. Providing personal hearing protectors.
- B. There are two types of recognized hearing protectors available for use in effectively reducing noise exposure.
 1. Ear plugs
 2. Ear muffs
- C. In most instances, earplugs are acceptable hearing protectors. Cotton plugs are not acceptable and shall not be used.
- D. When using earmuffs for hearing protection, special care must be given to ensure that they are disinfected before being issued to another employee.
- E. Employees are to be informed of the hazards associated with exposure to noise and the purpose and limitations of protective hearing devices. The wearing of this equipment will be mandatory.

EAR PROTECTION

Employees must be protected from noise levels, which can cause hearing impairment.

Noise exposures shall not exceed those listed in the Table below.

Table A

| Duration Per Day/Hour | Sound Level dBA Slow Response |
|--------------------------|----------------------------------|
| 8 | 90 |
| 6 | 92 |
| 4 | 95 |
| 3 | 97 |
| 2 | 100 |
| 1-1/2 | 102 |
| 1 | 105 |
| 1/2 | 110 |
| 1/4 or less | 115 |

When employees are exposed to sound levels exceeding acceptable levels, administrative or engineering controls to reduce the exposure shall be utilized. If these controls fail to reduce sound levels to an acceptable level, personal protective equipment shall be provided and use will be mandatory.

Exposure to impact or pulse noises shall not exceed 140 dB peak sound pressure level. In all cases where sound levels exceed the values shown in Table A, a continuing, effective hearing conservation program shall be instituted.

VII. WORKING OVER OR NEAR WATER

- A. Employees working over or near water, where the danger of drowning exists, shall be provided with U.S. Coast Guard approved life jacket or buoyant work vests.
- B. Prior to and after each use, the buoyant work vests or life preservers shall be inspected for defects, which would alter their strength or buoyancy. Defective units shall not be used.
- C. Ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations. Distance between ring buoys shall not exceed 200 feet.

- D. At least one lifesaving skiff shall be immediately available at locations where employees are working over or adjacent to water.

VIII. Fire Resistant Apparel

- A. Clothing made from fabrics or blends of acetate, nylon, polyester, and rayon are prohibited when working around flames or the hazard of electric arcs.
- B. While all fabrics can burn, the degree of flammability depends on the fiber weight, weave of the fabric, and surface of the garment. Heavy tightly woven fabrics with smooth short pile are less likely to burn than fabrics with light fluffy pile. Typically heavy denim type work clothing is the least likely to increase the extent of the injury caused by flames or electric arcs.
- C. While it is important to wear the proper apparel while working near or adjacent to energized equipment, it is also a requirement to remove or render non-conductive all exposed articles. This would include items such as rings, watches, bands, or other articles that may increase the hazard of contact with energized parts.

SECTION 20

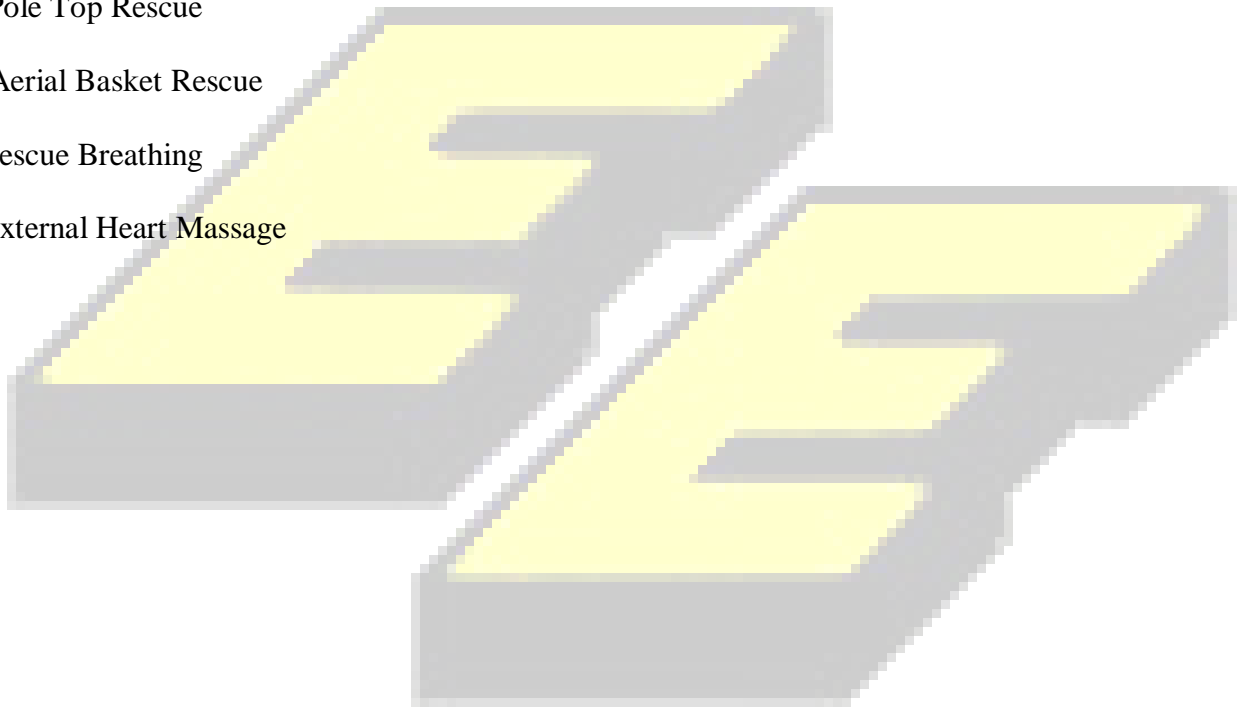
RESCUE PROCEDURES

POLETOP/ AERIAL

BASKETS

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- II. General
- III. Pole Top Rescue
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RESCUE PROCEDURES POLETOP – AERIAL BASKETS

I. Scope

This document provides information that can be used for the practice of a safe, simple, always available method for rescuing a person from a pole, other elevated structure or aerial basket device.

II. General

In order to have the best chance of resuscitating an accident victim, it is essential that the rescue be effected in as short a time as possible. With this important fact in mind, it is imperative that crew personnel practice the procedures outlined in this document on a regularly scheduled basis (at least once annually). The success of any rescue depends upon the people performing the rescue, knowing exactly what to do.

III. Pole Top Rescue

Rescue of a person from a pole or other elevated structure may be required for illness, severe injury or victim rendered unconscious, due to a physical blow, illness, heart attack, or electric shock.

In any of these situations, the victim may require help to reach the ground safely. Sometimes he/she may require only a little assistance in coming down under their own power. Other times you may be required to lower an unconscious or severely injured person.

In any emergency situation, proceed as follows:

A. Size Up the Situation

Call to the victim. Is the person conscious or unconscious? Is time a factor? Establish a course of action. Move quickly, but not to the extent that the rescuer could sustain an injury and be of little or no help to the victim.

B. Call For Assistance

Make use of the Company radio, use a telephone or obtain assistance from a bystander.

1. Victim is conscious, he will be able to tell you of his need. Administer first aid, tie the victim off, lower him to the ground, administer further first aid, and call for help.
2. Victim is unconscious, heart beating, but not breathing. Not breathing can be determined by listening at the victim's mouth, watching or feeling the victim's chest. Provide an open airway for victim by tilting head back and giving two (2) slow breaths.
3. Victim is unconscious, heart not beating, and not breathing. Heart not beating can be

determined by checking pulse, contracting of pupil when eyelid is raised and noticeable change in skin color.

NOTE: In any event, do not attempt prolonged first aid, other than two (2) breaths, but lower the victim quickly to the ground where CPR can take place on a hard firm surface.

C. Render First Aid

Provide two (2) slow breaths if victim is not breathing.

D. Lower Victim To Ground

The procedure for rigging a victim to be lowered to the ground requires no special harness. The line used for rescue is a synthetic handline; ½” in size for line personnel. Because handline is also the person’s lifeline, it SHALL ALWAYS be carried aloft each time a pole or other elevated structure is climbed, or aerial basket device is used.

The approved synthetic handline shown in Illustration 1, SHALL in all cases have a loop in one end of the line a safety snap in the other.

The rescuer should belt into the pole before reaching the victim. This is a necessary precaution in the event the victim is in contact with an energized conductor or that the victim suddenly moves, causing the rescuer to loose his / her grasp o the pole.

CAUTION: MAKE SURE THE FALL LINE IS NOT LOOPED OVER THE SNAP END OF THE LINE!!

If there is any possibility that a double loop of he line over the hardware selected can become wedged, use Option #2.

Loop the snap end of the line around the victim’s back, just under the armpits. Bring the snap around to the front of the victim’s chest and snap into the line. Care must be taken that the line, when passed around the victim’s back, does not catch on tools from the victim’s body belt, resulting in the line being too far below the armpits.

Remove slack from the handline. Keeping a firm grip on the fall line, cut the victim’s safety strap and lower the victim to the ground. Once the victim reaches the ground, he/she should be placed flat on his / her back and given necessary first aid.

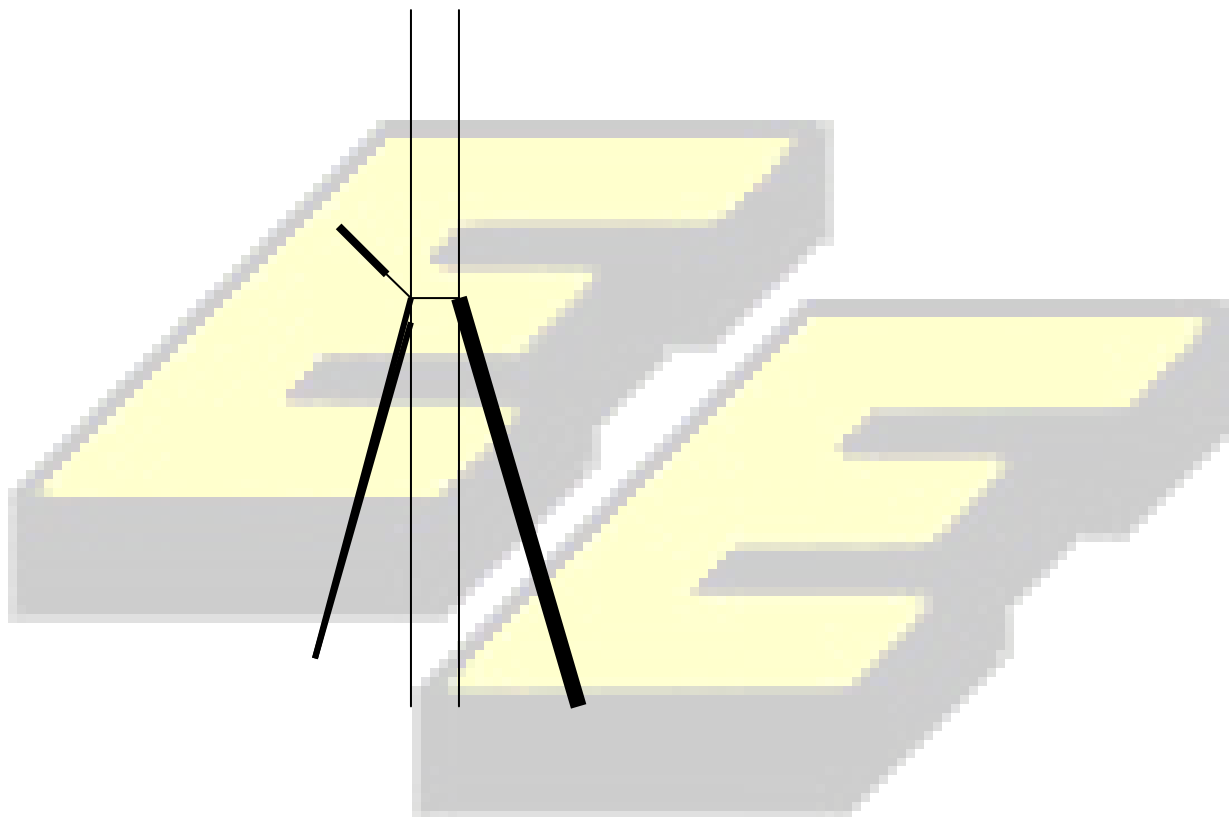
Option #2

In armless construction, it is not always possible to double loop the handline as described in Option #1 with out imposing the danger of wedging the line, Option #2 requires the handline to be placed over the selected hardware, as shown in Illustration No. 3 . Enough friction or drag for control is provided by looping the free end (snap end) of the line twice around the fall line.

Loop the snap end of the line around the victim's back, just under the arm pits. Bring the snap end of the line around to the victim's chest and snap into the line.

Remove slack from the line. Keeping a firm grip on the fall line, cut the victim's safety strap and lower victim to the ground.

ILLUSTRATION NO. 4



The screwdriver method is recommended for rescue on clear poles or on poles where the hardware does not lend itself to easy rigging of the handline.

On all poles, drive the screwdriver into the pole approximately two (2) feet above the victim's head to a depth of approximately two (2) inches. The handle of the screwdriver should have an upward tilt of approximately two (2) inches from the level plane.

One advantage to using the screwdriver method is that the rigging can take place at the same elevation as the victim.

Pass the snap end of the line once around the pole and over the top of the screwdriver blade. The fall line must be on top of the running end of the line so as not to hamper the descent of the victim. Loop the snap end of the line around the victim's back, just under the armpits. Bring the snap around to the victim's chest and snap into the line. If this is the loop end of the handline, tie a bowline know or three (3) half-hitches into the line in front of the victim's chest. Remove slack from the handline. Keeping a firm grip on the fall line, cut the victim's safety strap and lower victim to the ground.

B. Option #1 (Proximity of Pole)

1. Size up situation-call to victim. Is victim conscious? Is time a factor? Establish a course of action. Move quickly, but not to the extent that the rescuer could sustain an injury and be of little or no help to the victim.
2. Call for assistance.
3. Wearing Rubber gloves, operate override control to transfer basket operation to ground control. Maneuver basket against body of pole. Pick an uncongested area on pole if practical.

CAUTION: OVERRIDE CONTROL MUST BE TRANSFERRED BACK TO BASKET BEFORE RESCUER CLIMBS POLE

4. Put on climbers, body belt, rubber gloves and sleeves, if required. Take along tools to effect the rescue. When climbing the pole, provide a clear path for the victim's decent.
5. Quickly evaluate condition of victim.
6. Render first aid, but do not waste time other than two (2) slow breaths if victim is not breathing.
7. Rig handline for lowering the victim to ground. (See ole Top Rescue Pages 3 and 4). If no handline is present on pole, take handline from aerial basket device and rig for screwdriver method as described in option #3 (Pole Top Rescue Pages 6, 7 and 8).

NOTE: IF YOU ARE UNABLE TO FASTEN THE HANDLINE UNDER THE VICTIM'S ARM DUE TO THE POSITION OF THE VICTIM IN THE BASKET, SNAP THE LINE INTO THE "D" RING OF THE AERIAL BASKET BODY BELT. THIS BELT IS NORMALLY WORN AROUND A PERSON'S WAIST AND IS HIGHER AND TIGHTER THAN A LINEPERSON'S BODY BELT.

1. Install a nylon sling in choker fashion on upper boom; approximately 6-1/2 feet above top lip of basket. See Illustration No. 5. Select a sling length that is compatible with upper boom. The sling should provide a six (6) inch loop for a snatch block. Install loop in sling on same side of boom as ground controls and in the quadrant of the boom over the basket.

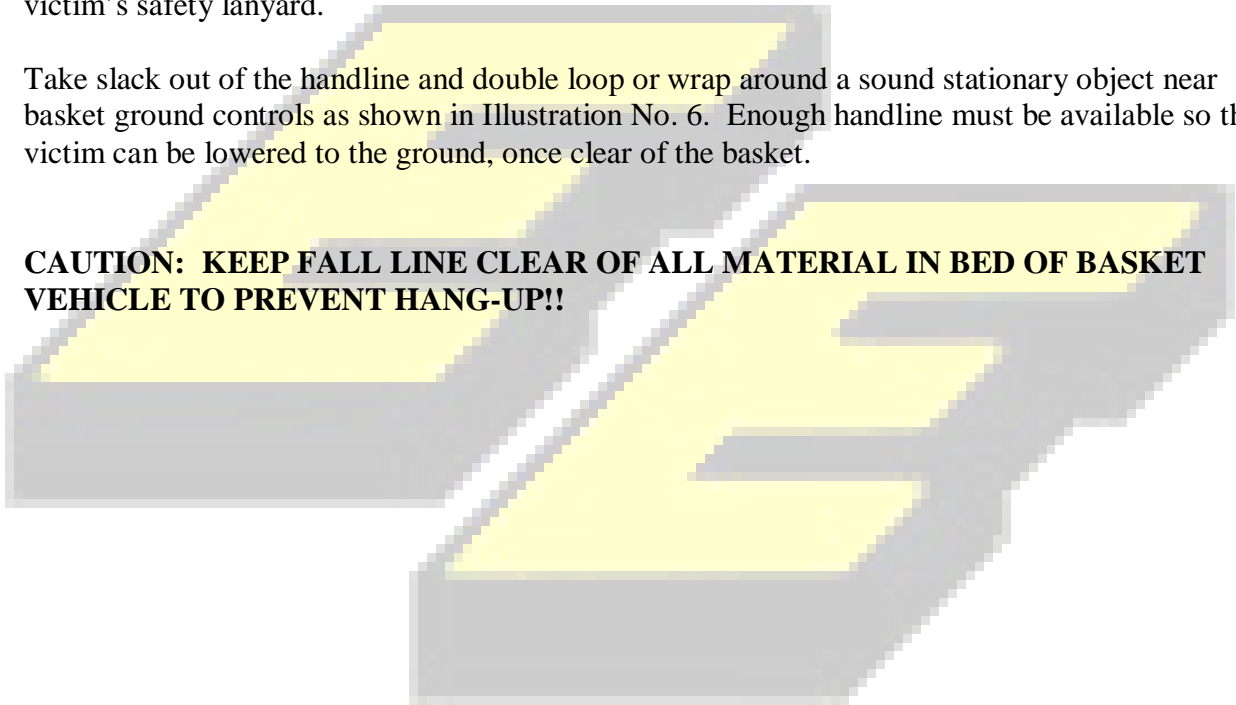
2. Install six (6) inch snatch block with snap end of handline through block into the choker sling. See Illustration 5. Approximately 25' to 30' of the synthetic handline is required to effect the rescue.

Note: IT IS RECOMMENDED THAT THE NYLON SLING AND SIX (6) INCH SNATCH BLOCK BE PERMANENTLY STORED IN THE SAME COMPARTMENT CONTAINING THE WATER JUG ON ALL AERIAL BASKET DEVICES. IF USING A RENTAL BASKET DEVICE OR OTHER VEHICLE NOT HAVING A WATER JUG COMPARTMENT, MAKE SURE A NYLON SLING AND SIX (6) INCH SNATCH BLOCK ARE READILY AVAILABLE!!

3. Loop the snap end of the line around the victim's back- just under the armpits. Bring the snap end into the line. If unable to do so, snap the handline into the victim's "D" ring. Unsnap or cut the victim's safety lanyard.

4. Take slack out of the handline and double loop or wrap around a sound stationary object near basket ground controls as shown in Illustration No. 6. Enough handline must be available so the victim can be lowered to the ground, once clear of the basket.

CAUTION: KEEP FALL LINE CLEAR OF ALL MATERIAL IN BED OF BASKET VEHICLE TO PREVENT HANG-UP!!



AERIAL BASKET RESCUE

The person being rescued may be conscious or unconscious and the rescue plan must allow for this. It is important that during the rescue the casualty is not moved into a potentially dangerous situation. Ideally, the rescuer should be able to communicate with the casualty at all times or see the casualty at all times or communicate with someone who can see the casualty at all times.

I. General Procedure for Casualty Recovery

- A. Assess the situation fully before commencing a rescue operation
- B. Request medical assistance
- C. Identify proper position from which to carry out the operation
- D. Identify proper anchorage points
- E. Identify a point of safety to move the casualty to
- F. Make sure all involved are aware of the procedure to be carried out and their role within it
- G. Ensure personnel have been trained in rescue procedures and are competent to carry out their role
- H. Carry out the rescue steadily and in a controlled manner
- I. Make sure communication is maintained at all times
- J. Monitor the casualty's condition at all times and where possible provide the necessary first aid
- K. Conduct a review of the whole situation identifying areas of improvement for the future

II. Suspension Trauma

All users of personal fall protection systems, and others involved with work at a height, should be aware of the following precautions that might need to be taken in the event of a casualty being in a suspended position.

- A. The longer the casualty is suspended without moving; the greater the chances are of suspension trauma developing and the more serious it is likely to be. Therefore, an injured person hanging in a harness-awaiting rescue should be removed from upright suspension as quickly as possible. The aim should be to do this within 5 minutes. This is particularly important for a casualty who is motionless.
- B. A conscious casualty should be encouraged to exercise their legs gently, to stimulate circulation of the blood.

NOTE: Manufactures provide various types of suspension trauma relief equipment for use by a suspended person. These can delay the effects of suspension trauma, but they only work on conscious and able casualties, so they are not an alternative to rescue.

C. Regarding the position of the casualty:

1. During rescue, a position with the lower limbs slightly elevated may be preferable
2. After rescue, position the casualty in an upright sitting position, with knees bent – DO NOT allow them to lie flat.
3. Only move the casualty to a fully horizontal position at the advice of qualified medical personnel.
4. If suspension trauma is a possibility, alert medical agencies immediately and advise them of the issues, the casualty might need dialysis to protect the kidneys.

Following an accident, the casualty should be:

- a. Removed from the suspended position and cared for in a proper manner.
- b. Given medical assistance as quickly as possible.

Users of personal fall protection equipment should be aware of the issues surrounding suspension trauma. In addition, some staff will require training in rescue techniques or alternatively it may be necessary to create a specially trained rescue team on site to be available at short notice.

If a worker's fall is arrested

1. Will someone see it happen?
 - Co-workers
 - Other trades
 - Plant personnel
 - Public
2. How will the worker call for help?
 - Voice
 - Whistle
 - Cell phone
 - Telephone
3. Who will the worker call?
 - Nearest co-worker
 - Supervisor/employer
 - Building superintendent
 - 911 where available
 - Fire department/ambulance
4. Is information available?
 - Emergency phone numbers
 - Site address
 - Directions and access for fire truck or other emergency services
 - Which floor/how high up
 - Worker's condition after fall
5. How will rescue workers get to the worker?
 - Ladder
 - Keys to building and roof
 - Elevator
 - Pull worker in through window or balcony
 - Pull worker up to roof
 - Climb/rappel down the building/structure
 - Aerial equipment from ground
 - Suspended access equipment
6. What rescue equipment is needed?
 - Ladder
 - Rolling scaffold
 - Suspended access equipment
 - Ropes
 - Aerial ladder truck
 - Boom truck or scissor lift
 - Climbing/rappelling equipment
 - First aid kit
7. What if the worker is injured?
 - Rescue within 15 minutes
 - Qualified first-aider
 - Emergency services notified
 - Hospital alerted
8. How will the public be protected?
 - Assign someone to direct traffic
 - Set up barriers
9. How will the accident scene be protected?
 - Prevent further injury or damage
 - Set up barriers
 - Preserve wreckage
 - Aid investigation later
10. Are there any other considerations?
 - Working alone
 - Language barrier
 - Unusual features of building/structure
 - Wind
 - Other hazards
 - No 911 in area
 - No emergency services nearby
 - Distance from high rescue teams

V. RESCUE BREATHING

Start rescue breathing immediately and continue until victim is breathing on his/her own or another qualified person relieves you or medical help requires.

Proceed with Rescue Breathing As Follows

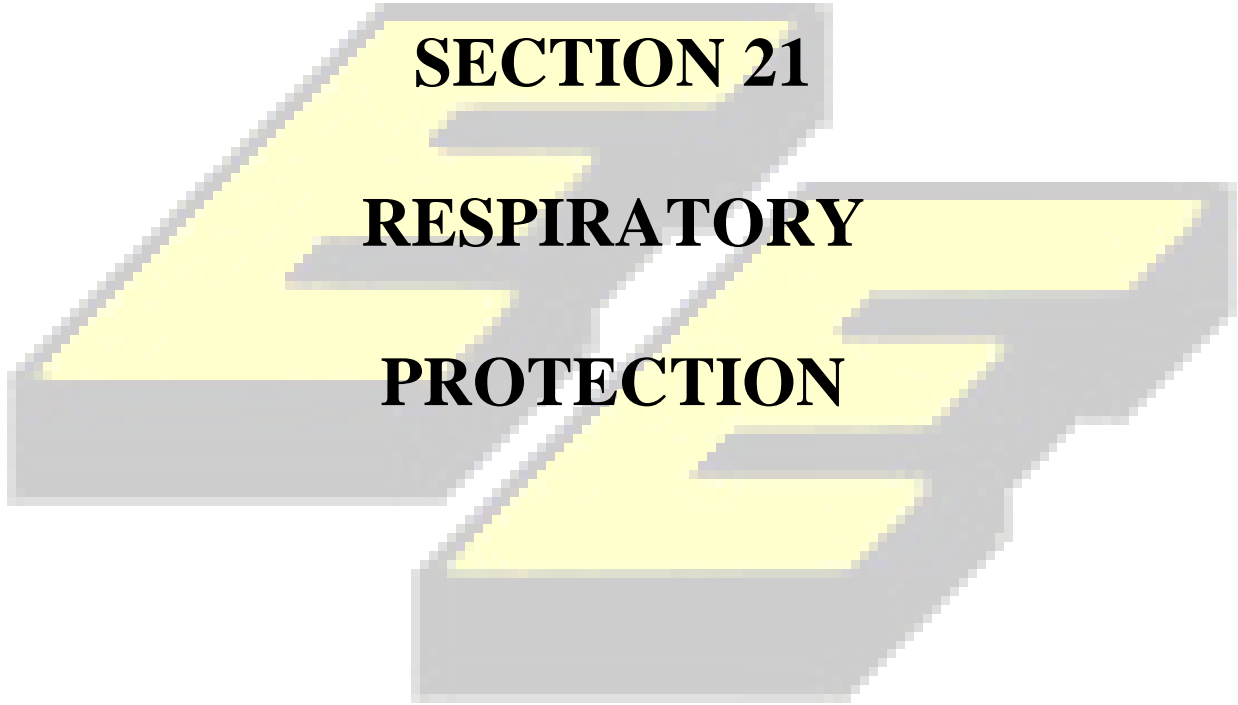
- A. Position victim, as shown in Illustration No. 9, so you can place your mouth over the victim's mouth.
- B. Give two (2) slow breaths- seal victim's mouth with yours. Blow to inflate lungs.
- C. Listen- for exchange of air, signs of throat obstructions or for victim to breathing on their own.
- D. If victim does not respond- continue breathing at the rate of once every five (5) seconds. Blow until you see his / her chest rise.

If mouth-to-mouth resuscitation cannot be used, pull or push jaw into jutting-out position and use mouth-to-nose.

VI. EXTERNAL HEART MASSAGE

After giving victim two (2) slow breaths, check for breathing and for pulse (either side of neck).
IF THERE IS NO PULSE, PROCEED WITH EXTERNAL HEART MASSAGE AS FOLLOWS:

- A. Place victim on a flat firm surface.
- B. To give chest compressions correctly, locate the xiphoid shown in Illustration No. 12. It is the lower end of the sternum (breastbone).
- C. Put your other hand on top of the first and lace your fingers together as shown in Illustration No. 15. Lacing the fingers will help keep fingertip pressure from the lower hand off the ribs, which could cause damage.



SECTION 21
RESPIRATORY
PROTECTION

RESPIRATORY PROTECTION

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IV. Types of Respiratory Protection

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B. Particulate Filter Respirator

C. Gas Masks

D. Air Line Respirators

E. Self Contained Breathing Apparatus

V. Cleaning, Maintenance and Storage

VI. Inspection of Respirators

VII. Training

RESPIRATORY PROTECTION

I. PURPOSE

- A. To provide employee respiratory protection in accordance with 29 CFR 1926.103

II. SCOPE

- A. Employees who are or may be exposed to hazardous concentration of gases, vapors, smoke, fumes, mists, or dusts shall be provided, and required to wear, respiratory protective equipment designed to protect the worker from such exposure.
- B. Employees shall use the provided respiratory protection in accordance with the instruction and training received. Where the use of such protection is required, initial training in this equipment will be provided.
- C. In areas where respiratory protective equipment is or may be required due to the presence of substances immediately hazardous to life, excess head or facial hair which prevents effective sealing of the mask shall be removed. Beards, “vandykes”, “goatees” or “Manchurians” are not acceptable. Sideburns shall not extend more than ½ inch below the earlobe and must be neatly trimmed at all times. Such facial hair directly interferes with the ability to obtain a seal with respiratory and / or resuscitative equipment.
- D. The wearing of contact lenses during the use of respiratory protection in contaminated atmospheres shall be prohibited.
- E. Where practical, respirators will be assigned to individual workers for their exclusive use.
- F. Respirators used routinely shall be inspected during cleaning. Worn or deteriorated parts shall be replaced. Respirators for emergency use such as self-contained devices shall be thoroughly inspected at least once a month and after each use.
- G. Appropriate surveillance shall be maintained of work area conditions and degree of employee exposure or stress. Regular inspection and evaluation of the program shall be conducted to determine its continued effectiveness.
- H. Persons should not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work and use the equipment as determined by a physician and / or Medical Review Officer certified to make that judgment.

III. Selection of Respiratory Protection:

- A. Various factors will determine the specific type of protection to be selected. In most instances, the selection requirement will be based only on a need for protection from a single contaminant; however, the individual (usually a medical doctor or certified industrial hygienist) responsible for administering the respiratory program must be aware that in some instances more than one air contaminant may be present and may cause serious health consequences if not taken into consideration or are merely overlooked as a minor nuisance. The items listed below shall be used as a guide to assist in determining when and how respiratory protection is required:

1. Identity of the substance or substances against which protection is necessary.
2. Hazards and the significant properties (chemical, toxic, ignitability, physical, etc.) of each air contaminant.
3. Method of exposure and levels of concentration for each air contaminant.
4. Nature of the hazardous operation or process.
5. Period of time for which respiratory protection is required.
6. Location of the hazardous area with respect to a source of uncontaminated breathable air.
7. Physical health and limitations of the individual who will use respiratory protection. (As determined by a medical doctor).
8. Functional and physical characteristics of the respiratory device.

Only MSHA/ NIOSH approved respiratory protection devices shall be used. The equipment type will be specified by a certified Industrial Hygienist.

IV. Types of Respiratory Protection:

A. Chemical cartridges

1. Chemical cartridges respirators normally consist of a face piece (half-face; mouth and nose or full-face; mouth nose and eyes) connected directly to one or two containers of chemicals. Various chemicals are used in the cartridge and each chemical is specific as to which contaminant (s) it will remove.

- 2 Chemical cartridge respirators are for use in non-emergency situations and are not to be used for atmospheres, which are immediately hazardous to life, and are not to be used in atmospheres, which have an oxygen deficiency.
- 3 Chemical cartridge respirators are designed for atmospheres which are harmful only after prolonged or repeated exposures to air contaminants.
- 4 Replacement of chemical cartridges depends on activity during use, concentration of air contaminants and the type of chemical cartridge being used. Multi-purpose chemical cartridges generally do not last as long as single purpose chemical cartridges.
- 5 There are three important rules that apply to the selection of chemical cartridge respirators:
 - a. They should not be used for exposure to harmful air contaminants, which cannot be detected by odor.
 - b. They should not be used as protection where air contaminants are highly irritating to the eyes.
 - c. They shall not be used for protection against air contaminants, which are not effectively controlled by chemical cartridges regardless of concentration.

B. Particulate Filter Respirator

1. A particulate (mechanical) filter respirator is designed to give protection against particulate contaminants such as non-volatile dusts, mists or metal particles. The items to be concerned with in the selection of this type of respiratory are resistance to breathing caused by the filtering element, the fit of the face piece to various sizes and shapes of faces and the actual size or fineness of the particulate to be filtered out.
2. This type of respirator does not offer protection against oxygen deficiency, carbon monoxide, gases or vapors. Specially adaptable particulate filters are available for usage with chemical cartridge respirators where suspected air contaminants require a multiple purpose type respirator.

C. Gas Masks

1. The gas mask type air purifying respirator consists of a face piece connected to a chemical canister by a flexible hose. Again, the chemical used is specific as to which contaminants

are removed from the breathable air. Canister type gas masks are generally used as an emergency respiratory device in atmospheres immediately hazardous to life.

2. They shall not be used where oxygen deficiency or carbon monoxide is a suspected hazard, such as firefighting.
3. Generally, gas mask type respirators shall not be used in areas where air contaminants are in high concentrations, generally above two percent of the total volume.

D. Air Line Respirators

1. The airline respirator is connected to a suitable compressed air source by a hose, which delivers breathable air to the user, either continuously or intermittently, in sufficient volume to meet breathing requirements. The face piece normally provides full face (mouth, nose and eye) coverage, but is also available in a half face (mouth and nose) model.
2. Air line respirators should only be used in atmospheres where the air contaminants are not immediately harmful to life or where the wearer can escape without the use of a respirator.

These limitations are necessary because the air supply is solely dependent upon an outside source which, is not readily available to the wearer. There are three basic types of air line respirators.

- a. Constant flow units are normally used where there is ample air supply such as provided by an air compressor.
- b. Demand type airline respirators deliver airflow only during inhalation with exhalation to the atmosphere. Demand types are generally used where only compressed air cylinders are available.
- c. Pressure demand flow respirators are used in atmospheres where the possible inward leakage around the face piece is unacceptable (caused by negative pressure during inhalation) and where the relatively high air consumption of the constant flow type respirator is unacceptable.

E. Self Contained Breathing Apparatus

1. A self-contained breathing apparatus provides complete respiratory protection in toxic gas atmospheres and oxygen deficient atmospheres. For this reason, they are ideally suited for emergency situations, but are but are highly limited in normal work situations because they supply a specific amount of breathable air (normally 15 to 30 minutes of air consumption).

V. Cleaning, Maintenance and Storage of Respirators

A. Each employee will be responsible for their respirators and they shall be regularly cleaned and disinfected. Respirators issued for the exclusive use of one worker shall be cleaned after each day's use. Those respirators used by more than one individual shall be cleaned and disinfected after each use. The following is the guide for an effective cleaning program.

1. Remove any filters, cartridges or canisters. Do not reuse filters, cartridge or canisters if their effectiveness no longer meets requirements.
2. Wash face piece and any breathing tubes or hoses in approved cleaner/ disinfectant solution. Use a hand brush to facilitate removal of dirt.
3. Rinse completely in clean warm water.
4. Air dry in a clean area.
5. Clean other respirator parts or accessories as recommended by the manufacturer's specifications.
6. Inspect valves, head straps, face piece and other parts for damage and or deterioration and replace as necessary.
7. Insert new filter, cartridges or canisters. Check seal to ensure seals are tight.
8. Place in clean plastic bags or other approved storage container.
9. Storage shall be such as to protect the respirator against dust, sunlight, heat, extreme cold, excessive moisture and damaging chemicals. In addition, storage should not distort the face piece or valves.

VI. Pre-Use Inspection of Respirators by Employees

- A. All respirators shall be inspected before and after each use.
- B. Self-contained breathing apparatus shall be inspected monthly. Air cylinders shall be fully charged according to the manufacturer's instructions. The proper operation of the regulator and warning devices shall be verified.
- C. Respirator inspection shall include a check of the tightness of connections and the condition of the face piece, headbands, valves, connecting tube and canisters.

Rubber and elastomeric parts shall be inspected for pliability and signs of deterioration. Stretching and manipulating rubber or elastomeric parts with a massaging action render them pliable and flexible and prevent them from taking a set during storage.

- D. Respirators that are not routinely used but are not kept ready for emergency use shall be inspected after each use and at least monthly to assure that they are in satisfactory working condition. A record shall be kept of such inspection dates and findings.
- E. Work areas shall be frequently and regularly inspected and a record shall be kept as to the type and concentration of air contaminants found.

VII. Training

- 4. For safe use of any respirator, it is essential that the user be properly instructed in its selection, use and maintenance. Both supervisors and workers shall be instructed by competent persons. A minimum training procedure shall include at least the following:
 - 9. Instruction in the nature of the hazard, whether acute, chronic or both and an honest appraisal of what may happen if the respirator is not used.
 - 10. Explanation of why engineering control methods are not immediately feasible. Every possible effort should be made to reduce or eliminate the need for respirators.
 - 11. A discussion of why the selected respirator is the proper type for the particular purpose.
 - 12. A discussion of the respirator's capabilities and limitations.
 - 13. Instruction and training in the actual use of the respirator (especially a respirator designed for emergency use) and close, frequent supervision to assure proper use. Training shall include pre-use inspection of the respirator and components by user.
 - 14. Instruction and training on cleaning maintenance, inspection and storage of respirators.
 - 15. Discussion and training in recognizing and reacting to emergency situations.
 - 16. Training shall provide the individual with an opportunity to handle the respirator, have it fitted properly, test the face piece to face seal, wear the respirator in normal air for a long familiarity period and wear it in a test atmosphere. (FIT TEST)
 - a. ENERGY ERECTORS, INC. shall maintain a record of who has received the training and FIT TEST. The record should reflect where, when, type, etc. This record should be retained on the work site for the duration of the project, and with the Safety Office in Leesburg, Florida.

SECTION 22

SAFETY MEETING

AGENDA

AND

TOPICS

SAFETY MEETING AGENDA AND TOPICS

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HOW TO CONDUCT A SAFETY MEETING

- I. Purpose
- II. Length
- III. People at the Meet
- IV. Overcoming Resistance
- V. Adults in a Learning Situation
- VI. The 3 P's
- VII. Documentation of Safety Meeting
- VIII. Techniques
- IX. Teaching and Learning
 - Safety Meeting Form
 - Safety Meeting Topics



CONDUCTING AN EFFECTIVE SAFETY MEETING

I. The Purpose of a Safety Meeting

- A. Persuade people to work safely.
- B. Get people to think about workplace safety concerns
- C. Increase job-related safety knowledge through systematic health and safety education.
- D. **Ideally**, attitudes and behaviors are changed.

II. Optimal Meeting Lengths

- A. Informal safety meetings – 5-10 minutes
- B. Formal safety meeting- 30-40 minutes
If topic is absolutely riveting, one hour is the maximum

III. Most People at Meetings Have Some Similar Characteristics

- A. They don't like to go unless they will be interested or entertained.
- B. People can absorb only a few ideas at a time 1,2,or 3 at most.
- C. People become irritated and unreceptive if they are uncomfortable.
- D. Someone who is personally and passionately interested in safety will sit through anything.
(How many of those are in your meetings?)
- E. Mismanagement leaves a wrong impression even if the meeting was good.

IV. Keys to Overcoming Employee Resistance to Safety Initiatives

- A. Seek their input.
- B. Involve them in decision-making
- C. Cede to them the responsibility for the outcome.

V. What Adults in a Learning Situation Want:

- A. To be involved in the process.

- B. Active learning
- C. Is it related to real world experiences and useful NOW.
- D. To know “How an I doing?”
- E. A variety of techniques.

VI. The 3 P’s

Planning
Preparation
Presentation

VII. Documentation of the Safety Meeting

- A. After the meeting, prepare for documentation minutes of the formal meeting including:
 1. Attendance roster
 2. Date
 3. Time
 4. Location
 5. Subjects covered
 6. Meeting conductor
 7. Suggestions/ Comments
 8. Questions that were raised to be addressed at the next meeting

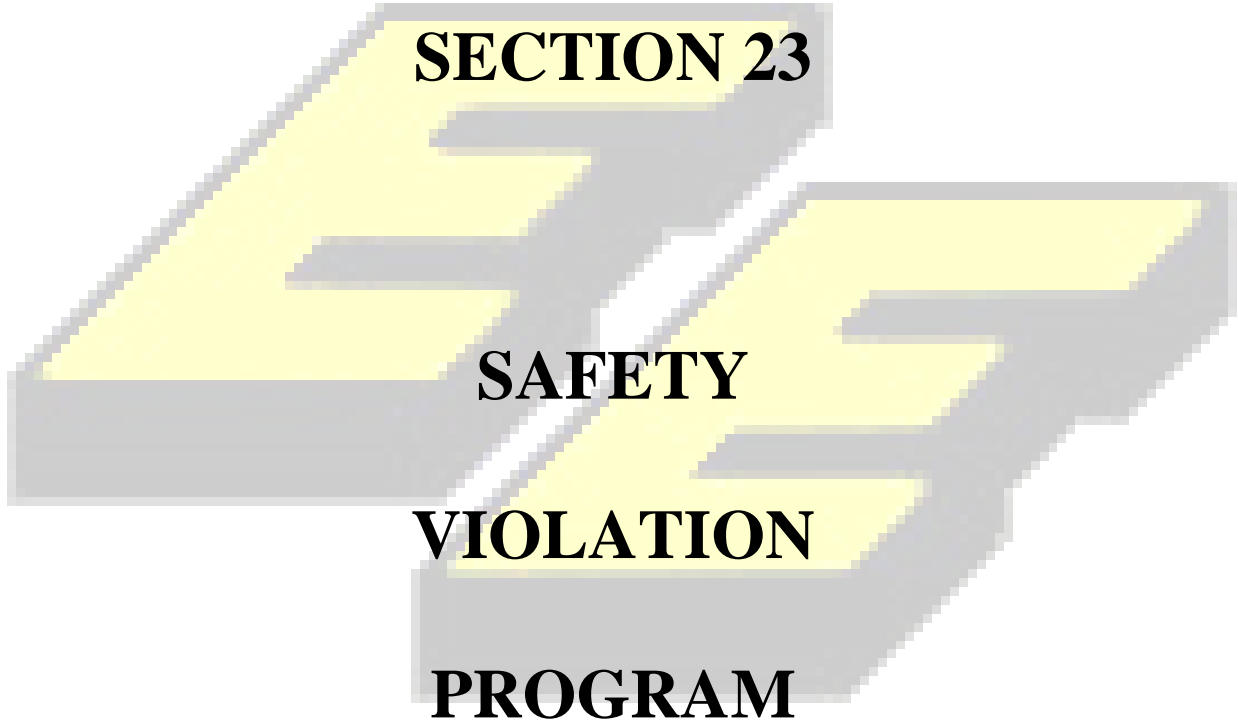
VIII. Various Techniques That Can Abe Used In A Presentation

- A. Activities, games, contest, rewards, posters, number find, life savers.
- B. Humor (as appropriate), cartoons
- C. Encourage participation
- D. Mnemonics (memory aids), WIIFM(What’s In It For Me?), 3P’s
- E. Styles (tactile, visual auditory), overheads, spoken presentations.
- F. Use of illustrations and visuals, posters and cartoons.
- G. Varied Media- Demonstration, games, activities, visual aids and overhead projectors.

X. Teaching and Learning

Teaching/training/lecturing/ informing **IS NOT** synonymous with learning. Learning results in a change in behavior. The challenge is to increase safety knowledge so that it affects the behavior and attitudes of the employee.





SECTION 23
SAFETY
VIOLATION
PROGRAM

SAFETY VIOLATION PROGRAM

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I. Written Program

II. Sample Violation Form



To: All Job Superintendents, Energy Erectors, Inc. Leasing Division

Re: Safety Violation/ Disciplinary Action Program

Effective February 20, 1990, we instituted a procedure for citations and disciplinary action violations of our safety program.

This program was created, under the guidelines of the U.S. Department of Labor (OSHA), to record all safety violations and the disciplinary action taken by the employer.

When any ENERGY ERECTORS, INC. Supervisor, which includes Foremen and General Foremen, sees a safety violation, a three level system of progressive discipline will be initiated as follows:

1st violation- The employee will be given a verbal warning and told that the next violation will cause a written warning. Further, that if a third violation occurs, the employee will be terminated. A not shall be routed to the employee's personnel file indicating that a verbal warning was given and on what date.

2nd violations- The employee will be given a written reprimand informing him/her of the problem and also that a third violation will be cause for termination. A copy of the written warning shall go to the employee's personnel file.

3rd violation- Employee will be terminated.

Note: If the severity of the violation so warrants, termination may be initiated at any time or step in the process. A complete file of all violations and disciplinary actions will be kept for future reference.

All ENERGY ERECTORS, INC. Supervisors are urged to cooperate in making our projects safer for all workers and to enforce this program. Any Supervisor who knows of a safety violation and does not cooperate in this program will be liable for a safety violation ticket himself.

A supply of these tickets is enclosed for your use and more are available from this office. Contact the undersigned if you have any comments and /or questions.

Paul Yeckley- Corp. Safety Director

William Beers- President



SECTION 24
TOOLS
HAND AND POWER

TOOLS-HAND AND POWER

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I. General

II. Hand Tools

III. Power Saws

IV. Power Tools.



TOOLS- HAND AND POWER

I. GENERAL

- A. All tools being issued shall be in a safe, operable condition with all pertinent safety equipment in place.
- B. The employee shall be held responsible for the inspection of tools issued for his/her use.
- C. All hand and power tools must be maintained in safe working condition. It does not make any difference in the tools belong to the employee or if they are issued for the use by ENERGY ERECTORS, INC. . If the tools are unsafe, they must be identified,, tagged and removed from the site or work area.
- D. Any tools that are designed to have guards must have those guards in place at all times.
- E. All tools shall be kept in a neat and orderly fashion.
- F. Tool rooms with suitable storage racks and bins shall be provided wherever practical.
- G. When not in use, tools shall be returned to tool rooms or stored in suitable boxes or containers, or hung on racks. Cutting edges shall be protected and tools should not be placed where they will roll off benches or tables. Storage areas should be moisture free to prevent corrosion. Heavier tools shall be placed where they will not be tripped over.

II. HAND TOOLS

- A. Each Supervisor and Foreman shall be responsible for the safe condition of tools used by the employee, including tools which, may be furnished by the employees.
- B. Keep tools sharp and in good condition at all times. Dull tools contribute to accidents.
- C. If tools cannot be repaired properly, do not make any temporary or makeshift repairs. Send tools to an outside shop or return to Tool Control for repair or replacement.
- D. When tools are not being used, store them in their proper places.
- E. Keep hand tools off top of ladders.
- F. Keep points of screwdrivers sharp and square.
- G. All chisels shall be checked for mushroomed heads. Remove damaged chisels from the job.

- H. Exercise extreme care in using hand tools to prevent their contact with live circuits or equipment.
- I. Wooden handles of tools shall be free of splinters and cracks.
- J. Lubricate moving and adjustable parts to prevent wear and misalignment.
- K. Wrenches, including adjustable and pipe wrenches, shall not be used when jaws are sprung to the point that slippage occurs.
- L. Use hammers with flat striking surfaces.

III. POWER SAWS

- A. All portable, power driven circular saws shall be equipped with guards above and below the base plate or shoe. The lower guard shall cover the saw to the depth of the teeth, except for the minimum are required to allow proper retraction and contact with the work, and shall automatically return to the covered position when the blade is removed from the work.
- B. Radical saws shall have an upper guard which, completely encloses the upper half of the saw blade. The sides of the lower exposed portion of the blade shall be guarded by a device that will automatically adjust to the thickness of and remain in contact with the material being cut.
- C. Radial saws used for ripping shall have non-kickback fingers or dogs.
- D. Radial saws shall be installed so that the cutting head will return to the starting position when released by the operator.
- E. All swing or sliding cut-off saws shall be provided with a hood that will completely enclose the upper half of the saw.
- F. Limit stops shall be provided to prevent swing or sliding type cut-off saws from extending beyond the front or back edges of the table.
- G. Each swing or sliding cut-off saw shall be provided with an effective device to return the saw automatically to the back of the table when released at any point of its travel.
- H. Inverted sliding cut-off saws shall be provided with a hood that will cover the part of the saw that protrudes above the top of the table or material being cut.

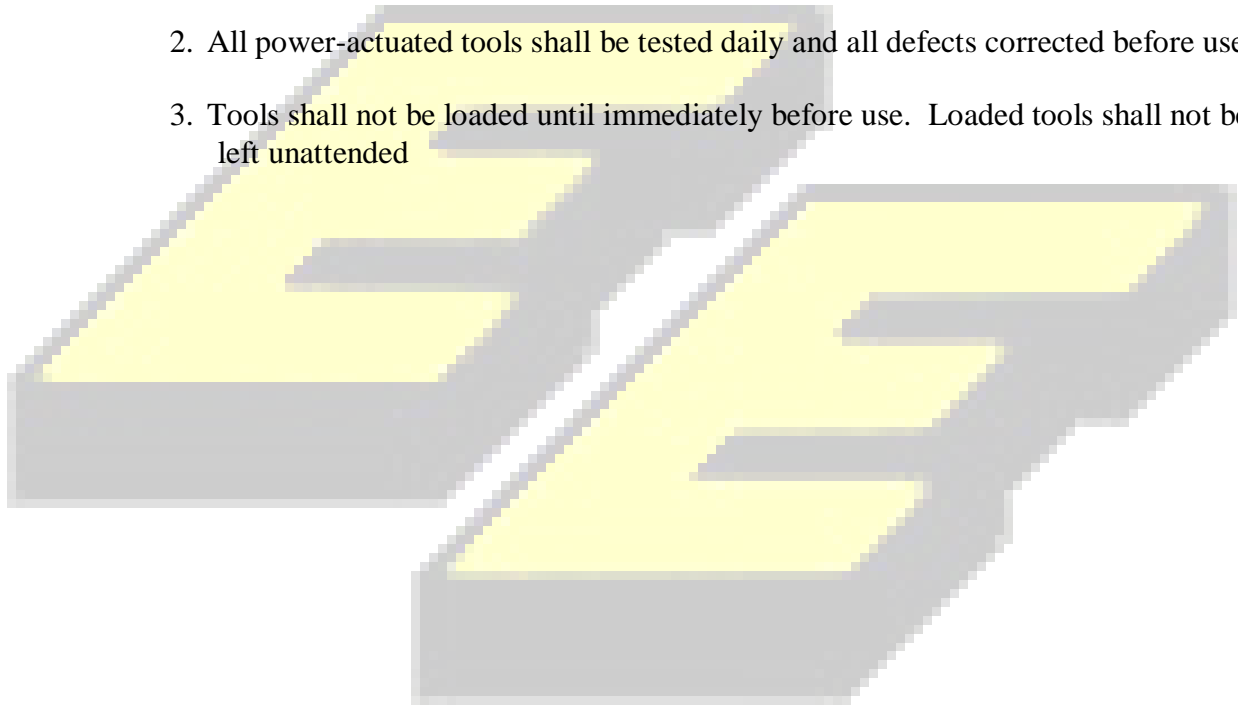
- I. Circular table saws shall have a hood over the portion of the saw above the table so mounted that the hood will automatically adjust itself to the thickness of, and remain in contact with, the material being cut.
- J. Circular table saws shall have a spreader aligned with the blade, spaced no more than ½ inch behind the largest blade mounted in the saw. This provision does not apply when grooving, dadoing, or rabbeting.
- K. Circular table saws used for ripping shall have non-kickback fingers or dogs.
- L. Feed rolls and blades of self-feed circular saws shall be protected by a hood or guard to prevent the hands of the operator from coming in contact with the in-running rolls.
- M. All portions of band saw blades shall be enclosed or guarded except for the working portion of the blade between the bottom of the guide rolls and the table.
- N. Band saw wheels shall be fully encased.

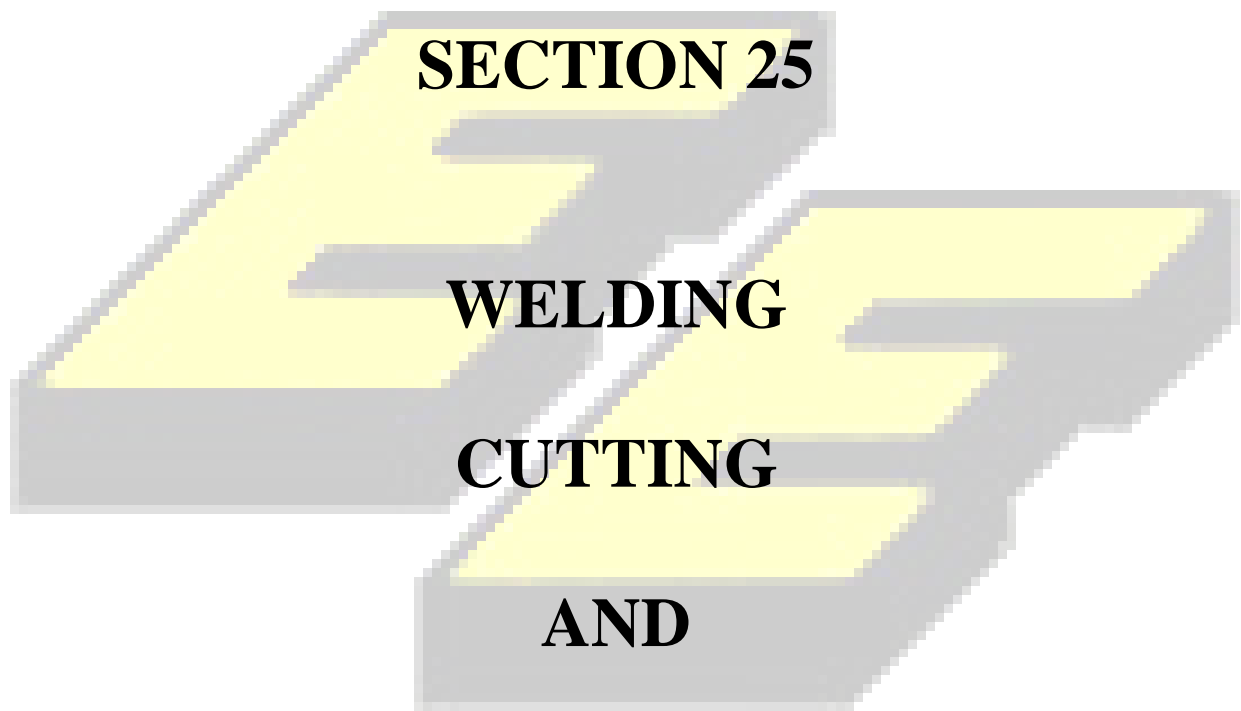
IV. POWER TOOLS

- A. Maintenance of equipment shall be systematic. All worn or damaged equipment shall be replaced or repaired immediately. All tools shall be cleaned, tested and inspected regularly.
- B. Safety devices, such as guards, shall be left in place and not removed.
- C. Employees using hand or power tools and exposed to the hazard of falling, flying, abrasive and splashing objects shall be provided with personal protective equipment necessary to protect them from the hazard.
- D. Only authorized employees who have been trained or had previous experience in the field shall be permitted to operate power tools.
- E. All electric power operated tools shall either be of the approved double-insulated or grounded type.
- F. When making adjustments or oiling any power tools, turn off the power first.
- G. When using an electric drill, always use a prick punch to provide starting operation for the drill bit.
- H. Wear proper clothing to prevent sleeves and other loose garments from being wound around the drill.

- I. All portable grinders shall be equipped with hood guards. In addition:
 - 1. Wheels used on portable grinders shall be inspected regularly. A cracked wheel may fly to pieces and shall be replaced immediately.
 - 2. Use a wheel with the proper RPM rating in all portable grinders.
- J. All grinders shall have abrasive wheels protected by guards and work rests.
- K. The safety guard shall cover the spindle end, nut and flange projections. The safety guard shall be mounted so as to maintain proper alignment with the wheel.
- L. At all times, work rests shall be used to support the material that is being altered. Work rests shall be of rigid construction and so designed to adjust closely to the wheel with a maximum opening of 1/8 inch to prevent the work from being jammed between the wheel and the rest which may cause wheel breakage. The work rest shall be securely clamped after each adjustment.
- M. The use of electric cords for hoisting or lowering tools shall not be permitted.
- N. Pneumatic power tools shall be secured to the hose or whip by positive means to prevent the tools from becoming accidentally disconnected. In addition:
 - 1. Safety clips or retainers shall be securely installed and maintained on pneumatic (percussion) tools to prevent attachments from accidentally expelled.
 - 2. The manufacturer's safe operating pressure for hoses, pipes, valves, filters, and other fittings shall not be exceeded.
 - 3. The use of hoses for hoisting or lowering tools shall not be permitted.
 - 4. All hoses exceeding ½ inch inside diameter shall have a safety device at the source of supply or branch line to reduce pressure in case of hose failure.
 - 5. The operating trigger on portable hand-operated equipment shall be so located as to minimize the possibility of its accidental operation and shall be arranged to close the air inlet valve automatically when the pressure of the operator's hand is removed. (Dead man's grip)
- O. The fluid used in hydraulic powered tools shall be of a fire-resistant type and shall retain its operating characteristics at the most extreme temperatures to which it will be exposed.

- P. The manufacturer's safe operating pressure for hoses, valves, pipes, filters and other fittings shall not be exceeded.
- Q. Belt sanding machines shall be provided with guards at each nip point where the sanding belt runs onto a pulley.
- R. The unused run of the sanding belt shall be guarded against accidental contact.
- S. When powder actuated tools are being used, strict adherence to federal, state and local requirements shall be observed. In addition, the following are required:
 - 1. Only trained employees shall be allowed to operate powder-actuated tools.
 - 2. All power-actuated tools shall be tested daily and all defects corrected before use.
 - 3. Tools shall not be loaded until immediately before use. Loaded tools shall not be left unattended





SECTION 25

WELDING

CUTTING

AND

CYLINDER HANDLING

WELDING, CUTTING AND CYLINDER HANDLING

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IV. Manual Electrode holders

V. Welding Machines

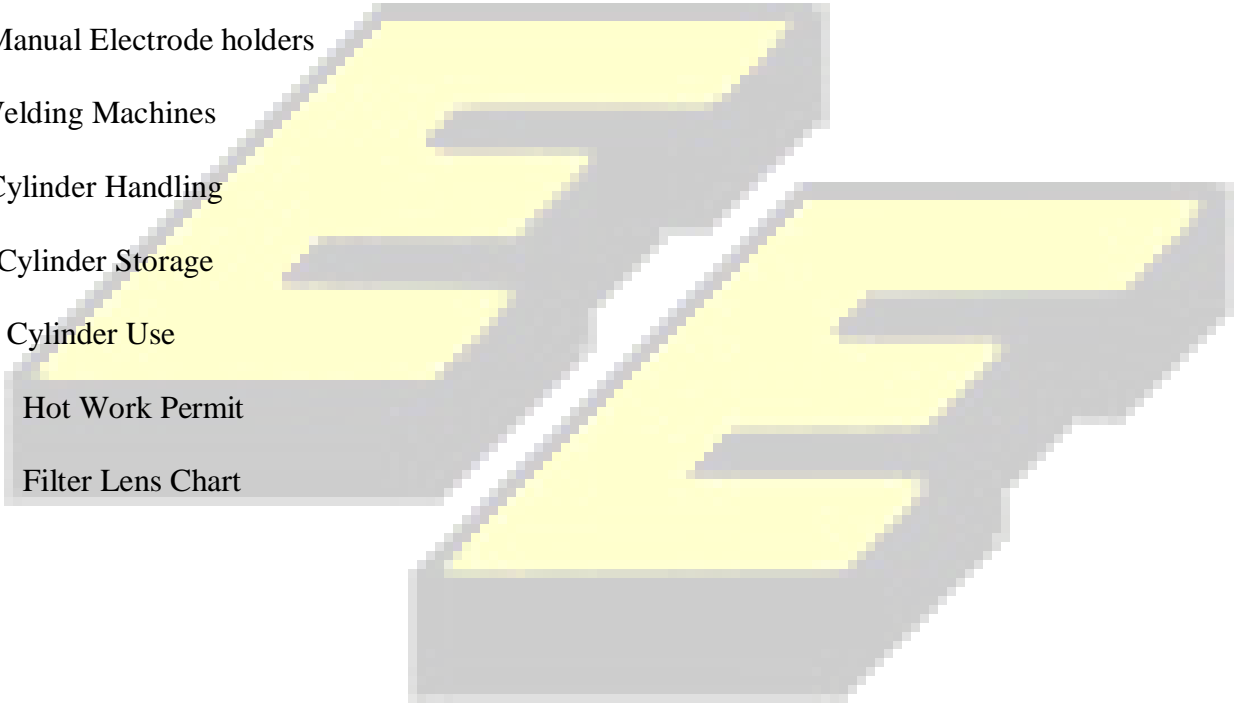
VI. Cylinder Handling

VII. Cylinder Storage

VIII. Cylinder Use

Hot Work Permit

Filter Lens Chart



WELDING, CUTTING AND CYLINDER HANDLING

I. GENERAL

When performing any welding, cutting, drilling, or any other operation producing heat or sparks within the confines of the existing plant, building or work area Procedures for Hot Work, must be followed. Work of this type is normally covered by a permit system.

ENERGY ERECTORS, INC. site superintendent or his safety representative shall be responsible for issuance and approval of construction hot work permits. At times it may be necessary to comply with contractual agreements with Construction Managers or Owners that want to be involved in the permit process.

All permit procedures must be carefully reviewed with all parties concerned and explicit instructions concerning these permits must be given to all supervisors and foreman.

Special care must be taken to insure that the conditions noted on the permit coincide with actual job condition before the permit is accepted. If discrepancies are noted, the job must be carefully reviewed and a new permit issued prior to starting the job.

ANY CHANGE IN THE CONDITIONS NOTED ON THE PERMIT AFTER THE JOB STARTS SHALL BE FROUNDS TO STOP THAT WORK IMMEDIATELY UNTIL THOSE CHANGED CONDITIONS CAN BE REVIEWED AND THE PROPER CORRECTIVE ACTION TAKEN.

In welding and cutting operations, suitable fire extinguishing equipment shall be maintained in a state of readiness at the work area for instant use. Such equipment shall consist of sufficient portable extinguishers, depending upon the nature and quality of combustible material exposed, and shall be in addition to the extinguishing equipment normally provided in the area.

A welder's helper or fire watch shall be required whenever cutting or welding is performed. This fire watch shall continue observation of the area for at least one half an hour after completion of the welding operations to detect and extinguish possible smoldering fires.

Cutting and welding are major producers of fires on construction projects because of molten metal and sparks. In cutting and welding, sparks may be showered 25 to 30 feet and may retain heat, which is sufficient to ignite combustible material for several seconds.

While welding and cutting may be the major producers of fires on a job site, other sources cannot be overlooked. Such as grinding, work with hammers and chisels, smoking and temporary light bulb breakage.

Good house keeping shall be performed when necessary to remove all loose and easily combustible materials and highly volatile materials, such as gasoline and solvents.

Wood planking, scaffolds, wooden forms and other combustible material that cannot be removed shall be shielded with fireproof blankets, sheet metal, or other suitable materials.

Extreme caution shall be used when cutting or repair welding of closed containers. Purge the container with live steam or fill with water before start of work. Before any cutting or welding is attempted, the container shall be checked with an explosive vapor meter. A vent or opening shall be provided for the release of any built-up pressure during the application of heat.

When removing excess weld metal, faulty weldments, or slag, the welder shall remove or raise the shield in order to see. Safety glasses and a protective face shield shall be used to protect the eyes from flying chips from the cleaning hammer.

Gloves shall be worn to protect the hands and wrists. Screening or shielding shall be used to protect other personnel in the area from flying chips.

Gloves shall be worn when cleaning and brushing surfaces to be welded and when wire-brushing weld metal.

Flame-resistant aprons of leather or other suitable materials shall be worn as protection against radiated heat and sparks.

Clothing should be free of oil and grease. Woolen clothing is not as readily ignited as untreated cotton clothing and aids in protecting the welder from changes in temperature. Synthetic clothing has a tendency to melt and cause burns, and should not be used.

Pockets and cuffs invite sparks. Collars should be buttoned and cuffs turned up inside pants. Pockets should be eliminated from fronts of vests, shirts and aprons or have buttoned flaps.

Fire-resistant leggings, high boots or other leg protection should be worn for very heavy work.

Safety shoes are recommended. Low-cut shoes with unprotected tops must not be worn.

Fire-resistant capes or shoulder covers shall be worn during overhead welding operations.

Leather caps should be worn under helmets to prevent burns during overhead welding operations.

High quality welding helmets of the approved type shall be worn. The proper shade of welding lens shall be used, and an adequate supply of cover lenses shall be available. Employees assisting welding operator shall also wear protective lenses, to avoid "welding flash" of the eyes.

Electrode stubs shall be disposed of in buckets or containers which are fire-resistant and which will not melt.

Careless disposal of hot stubs may result in:

- A. Injury to other workmen, especially those working at lower levels.
- B. A falling hazard, if dropped on the floor, walkway or other surfaces.
- C. A fire hazard, if dropped into combustible material.

Screens, shields or other safeguards shall be used to protect other workmen from arc rays.

II. TORCHES, REGULATORS AND GAUGES

When cutting or welding lead, zinc, cadmium-coated, chromium-bearing, mercury, mercury-bearing, lead-bearing or other toxic material, proper ventilation shall be provided for the removal of fumes, or the use of proper respiratory equipment shall be required. Beryllium containing materials require both local exhaust ventilation and airline respirators.

Clogged torch tip openings shall be cleaned with suitable cleaning wires, drills or other devices designed for such purpose.

Torches in use shall be inspected at the beginning of each working shift for leaking shutoff valves, hose couplings and tip connections. Defective torches shall be tagged "Out of Service" and shall not be used.

Torches shall be lighted by friction lighters or other approved devices, and not by matches or from hot work.

Torches, when not in use, shall be stored in a proper place to prevent being walked on or the storing of tools and materials on them.

Oxygen and fuel gas pressure regulators, including their related gauges, shall be in proper working order while in use.

Oxygen cylinders and fittings shall be kept away from oil and grease. Cylinders, cylinder caps and valves, couplings, regulators, hose and apparatus shall be kept free from oil and greasy substances and shall not be handled with oily hands or gloves.

All hoses and burning tips must be removed from confined spaces when not in use to eliminate the possible build-up of gases through leaks.

III. HOSES AND HOSE CONNECTION

The generally recognized colors are red for acetylene and other fuel-gas hose, green for oxygen hose, and black for inert-gas and air hose.

When parallel lengths of oxygen and acetylene hose are taped together for convenience and to prevent tangling, nor more than 4 inches out of 12 inches shall be covered by tape.

A single hose having more than one gas passage shall not be used.

All hoses in use, carrying acetylene, oxygen, natural or manufactured fuel gas, or any gas substance which may ignite or enter in combustion, or be in any way harmful to employees, shall be inspected at the beginning of each working shift.

Hose which has been subjected to flashback or shows evidence of severe wear or damage shall be properly tagged "Out of Service" and removed from the work area immediately.

Hose couplings shall be of the type that cannot be unlocked or disconnected by means of a straight pull. They shall be of the type that cannot be unlocked or disconnected by means of a straight pull. They shall be of the type requiring a rotary motion.

Boxes used for storage of gas hose shall be ventilated.

Hoses, cables and other equipment shall be strung overhead or otherwise positioned to keep clear of passageways, ladders, and stairways.

IV. MANUAL ELECTRODE HOLDERS

Only manual electrode holders which are specifically designed for arc welding and cutting, and are of a capacity capable of safely handling the maximum rated current required by the electrodes, shall be used.

Any current-carrying parts, passing through the portion of the holder which the arc welder or cutter grips in his hand, and outer surfaces of the jaws of the electrode holder, shall be fully insulated against the maximum voltage encountered ground.

When electrode holders are to be left unattended, the electrodes shall be removed and the holders shall be so placed or protected that they cannot make electrical contact with employees or conducting objects.

Hot electrode holders shall not be dipped in water to do so may expose the arc welder or cutter to electric shock.

When the arc welder or cutter has occasion to leave his work or to stop work for any appreciable length of time, or when the arc welding or cutting equipment is to be moved, the power supply switch to the equipment shall be opened.

V. WELDING GENERATORS, CABLES AND CONNECTORS

Power circuits shall be installed and maintained in accordance with the National Electrical Code. Prior to connecting or energizing any welding generator, check nameplate specifications to ensure proper available power requirements.

A qualified electrician shall "tie-in" all welding machines to the power source and a disconnect switch shall be installed on or near the machine.

Only standard electric arc welding equipment, such as generators, motor-generator units, transformers, rectifiers, etc., conforming to the requirements of the National Electrical Manufacturer's Association or the Underwriters' Laboratories, Inc., or both shall be used.

All arc welding and cutting cables shall be of the completely insulated, flexible type capable of handling the maximum current requirements of the work in progress, taking into account the duty cycle under which the arc welder or cutter is operating.

Only cables free from repair or splices for a minimum distance of 10 feet from the cable end to which the electrode holder is connected shall be used, except that cables with standard insulated connectors or with splices that are mechanically secure and covered with insulation quality material that is equal to that of the cable itself shall be permitted.

When it becomes necessary to connect or splice lengths of cable one to another, substantial insulated connectors of a capacity at least equivalent to that of the cable shall be used. If connections are effected by means of cable lugs, they shall be securely fastened together to give good electrical contact, and the exposed metal parts of the lugs shall be completely insulated.

Cables in poor condition shall not be used. When cables become worn to the extent of exposing bare conductors, the portion thus exposed shall be covered with insulating material equal to the cable.

A ground return cable shall have a safe current-carrying capacity equal to or exceeding the specified maximum output capacity of the arc welding or cutting unit it services. When a single ground return cable services more than one unit, its safe current-carrying capacity shall equal or exceed the total specified maximum output capacity of all the units, which it services.

Keep power lines to welding machines overhead and out of reach of anyone standing on the ground. If they must be on the ground, protect them and erect barricades so that personnel and vehicles cannot come in contact with them.

Welding machines shall be turned at the end of each shift, or when not in use for extended periods.

VI. CYLINDER HANDLING

Valve protection caps shall be in place and secured when handling compressed gas cylinders.

When cylinders are hoisted, they shall be secured on a cradle, sling-board or a pallet. They shall not be hoisted or transported by means of magnets or choker slings.

Cylinders shall be moved by, tilting and rolling them on their bottom edges. They shall not be intentionally dropped, struck or permitted to strike each other violently.

When cylinders are transported by powered vehicles, they shall be secured in a vertical position, with regulators removed and cylinders capped as necessary.

Valve protection caps shall not be used for lifting cylinders from one vertical position to another. Bars shall not be used under valves or valve protection caps to pry cylinders loose when frozen. Warm, not boiling, water shall be used to thaw cylinders loose.

Unless cylinders are firmly secured on a special carrier intended for this purpose, regulators shall be removed and valve protection caps in place before cylinders are moved.

Suitable cylinder truck, chain or other steadying device shall be used to keep cylinders from being knocked over while in use.

When work is finished, when cylinders are empty, or when cylinders are moved at any time, the cylinder valve shall be closed.

Compressed gas cylinders shall be secured in an upright position at all times except, if necessary, for a short period of time while cylinders are actually being hoisted or carried.

Compressed gas cylinders shall be legibly marked, for the purpose of identifying the gas content, with either the chemical or the trade name of the gas. Such marking shall be by means of stenciling, stamping or labeling which shall not be readily removable.

Compressed gas cylinders in use within the construction area shall be legibly marked with the responsible subcontractors name for identification for safety responsibility.

Cylinders, cylinder valves, couplings, regulators, hose and apparatus shall be kept free from oily or greasy substances.

A jet of oxygen must never be permitted to strike an oily surface, greasy clothes or enter a fuel oil or other storage tank.

VII. CYLINDER STORAGE

Cylinders shall be kept far enough away from the actual welding or cutting operation so that sparks, hot slag or flame will not reach them. When this is impractical, fire-resistant shields shall be provided.

Cylinders shall be placed where they cannot become part of an electrical circuit.

Fuel gas cylinders shall be placed with valve end up whenever they are in use. They shall not be placed in a location where they would be subject to open flame, hot metal or other sources or artificial heat.

Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease) a minimum distance of 20 feet or by a non-combustible barrier at least 5 feet high having a fire resistance rating of at least one-half hour.

Cylinders containing oxygen or acetylene or other fuel gas shall not be taken into confined spaces.

Empty cylinders shall have their valves closed and their protective caps secured. They shall be stored in an upright position and be secured properly.

VIII. CYLINDER USAGE

Cylinders shall never be used as rollers or supports, whether full or empty.
The numbers and markings stamped into cylinders shall not be tampered with.

If cylinders are found to have leaky valves or fittings which cannot be stopped by closing of the valve, the cylinder shall be taken outdoors away from any sources of ignition, slowly emptied and properly tagged "Out of Service".

No person, other than the gas supplier, shall attempt to mix gases in a cylinder. No one, except the supplier or person authorized by him, shall refill a cylinder.

No one shall tamper with safety devices in cylinders or valves.

All cylinders shall have a handle or wrench attached so that they can be turned off immediately, if necessary.

A hammer or wrench shall not be used to open cylinder valves with fixed hand wheels. If valves cannot be opened by hand, the cylinder shall be properly tagged "Out of Service" and removed from the work area.

Before connecting a regulator to a cylinder valve, the valves shall be opened slightly and closed immediately. The valve shall be opened slightly and closed immediately. The valve shall be opened while standing to one side of the outlet; never in front of it. Never crack a fuel-gas cylinder valve near other welding work or near sparks, flame or other possible sources of ignition.

Before a regulator is removed from a cylinder valve, the cylinder valve shall be closed and the gas released from the regulator.

Electrodes shall not be struck against a cylinder to strike an arc. Cylinders shall not be dropped or otherwise roughly handled.

When welding or cutting in confined spaces, care must be taken to assure proper ventilation.

If ventilating units block the means of egress or if the metal being heated has toxic significance, airline respirators must be used.

When using airline respirators, a standby man shall be positioned outside the vessel equipped with all necessary safety equipment in order to aid those inside the vessel in case of emergency. In all cases when a standby man is being used, a written Confined Space Entry procedure must be initiated and followed:

- A. All cylinder valves shall be closed when work is finished. Where a special wrench is required it must be left in position on the stem of the valve while the cylinder is in use so that the fuel-gas flow can be quickly turned off in case of emergency. In such case of manifolded or cupped cylinders at least one such wrench must always be available for immediate use.
- B. Acetylene shall not be used at a pressure in excess of 15 psi gauge, or 30 psi absolute.

**EXHIBIT
CUTTING AND WELDING PERMIT**

CRAFT _____ LOCATION _____

DATE _____

PERIOD OF VALIDITY FROM _____ TO _____

WORK TO BE PERFORMED _____

SPECIAL PRECAUTIONS REQUIRED _____

FIRE WATCH REQUIRED: YES _____ NO _____ (IF YES, DO FOLLOW-UP INSPECTION)

The above described location has been thoroughly inspected for fire hazards.

The necessary precautions have been stipulated and complied with. The employees understand the safety requirements.

INSPECTED BY _____

Owner/ Representative
(Optional)

Foreman

APPROVED _____

Site Superintendent

FILTER LENS SHADE NUMBERS FOR
PROTECTION AGAINST RADIANT ENERGY

| Welding Operation | Shade |
|--|----------|
| Shielded metal arc welding 1/16, 3/32, 1/8, 5/32 inch diameter electrodes | 10 |
| Gas-shielded arc welding (non-ferrous) 1/16, 3/32, 1/8, 5/32, inch diameter electrodes | 11 |
| Shielded metal-arc welding 3/16, 7/32, 1/4 inch diameter electrodes | 12 |
| Shielded metal –arc welding 5/16, 3/8, inch diameter electrodes | 14 |
| Atomic hydrogen welding | 10 or 14 |
| Carbon arc welding | 14 |
| Soldering | 2 |
| Torch brazing | 3 or 4 |
| Light cutting, up to 1 inch | 3 or 4 |
| Medium cutting, 1 inch to 6 inches | 4 or 5 |
| Heavy cutting, over 6 inches | 5 or 6 |
| Gas welding (light), up to 1/8 inch to 1/2 inch | 4 or 5 |
| Gas welding (medium), 1/8 inch to 1/2 | 5 or 6 |
| Gas welding (heavy), over 1/2 inch | 6 or 8 |

SECTION 26

ENERGY ERECTORS, INC.

LEESBURG, FLORIDA

COMPREHENSIVE DRUG

AND

ALCOHOL ABUSE POLICY

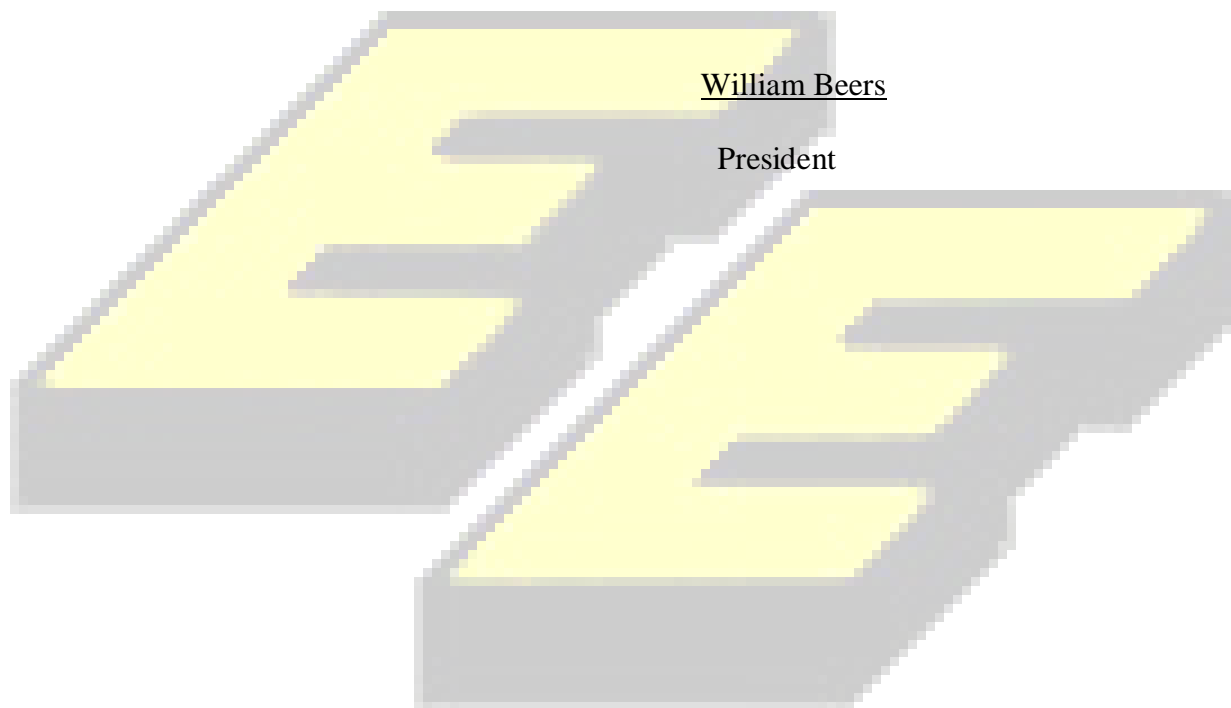
TO ALL PRESENT AND PROSPECTIVE EMPLOYEES:

Effective January 1, 1994, ENERGY ERECTORS, INC. will place in force the attached Comprehensive Drug and Alcohol Policy.

This policy replaces our previous policy.

The Management of ENERGY ERECTORS, INC. is fully dedicated to the implementation, administration and full compliance of this policy.

Anyone refusing to comply with this policy shall be subject to termination.



ENERGY ERECTORS COMPREHENSIVE DRUG AND ALCOHOL ABUSE POLICY

It is the policy of ENERGY ERECTORS, INC. (the “Company”) to provide a healthy and safe working environment for its’ employees and for those with whom we work by assuring that all employees are fit for duty while on the job. Employee involvement with alcohol or drugs can adversely affect the work environment, job performance, safety, security, and customer confidence. Therefore, the use, possession, distribution, manufacture, or dispensing of unlawful drugs while on duty or during working hours, or reporting for work or working while under the influence of, or impaired by alcohol, controlled substances or any other drug, the unauthorized possession on work premises of alcohol, controlled substances or any other drug, or the possession of drug paraphernalia, are strictly prohibited and are all cause for immediate discharge. This policy is subject to 440.102, Florida Stats., and 38F-9, Florida Admin. Code, which govern drug and alcohol testing in Florida.

1. ALCOHOL - Employees found drinking or possessing alcohol on the job or reporting to work obviously under the influence of, or impaired by intoxicants, shall be immediately discharged.

If the employee is not obviously under the influence of or impaired by intoxicants, but a reasonable suspicion exists that the employee may be under the influence of or impaired by intoxicants, such employee shall be tested in accordance with Paragraph 10.b.

2. DRUGS - Employees who test positive after a confirmatory test for any of the drugs in Paragraph 8, or who manufacture, use, distribute, dispense, or possess unlawful drugs, controlled substances, or drug paraphernalia, while on or off premises while on duty, will be subject to immediate discharge. Prescription drugs are accepted provided the employee has complied with the medication reporting requirement of the Policy and is using the drug in compliance with physician’s direction and prescription.

3. MEDICATION – Employees who report while being treated for a medically verifiable condition requiring the use of prescription or over-the-counter drugs or medication or controlled substances, which may alter the employee’s physical or mental abilities, must report to the employee’s immediate supervisor. See Exhibit A for a listing of such substances.

The supervisor may report such use to the Company’s Drug Program Coordinator who may require the employee to submit medical documentation to the Medical Review Officer regarding the use and effects of such drug, substance or medication. All information so reported shall be kept confidential. Employees have a responsibility to the Company and to those with whom they work to read all information or labels on medication and to ask their physician what effect the drug, substance, or medication may have on them physically or mentally. An employee who fails to comply with the aforementioned will be subject to disciplinary action up to and including discharge.

4. REPORTING OF POLICY VIOLATIONS- Employees shall abide by the terms of this Drug and Alcohol Policy and shall immediately report any unsafe working condition or new hazardous activity that may jeopardize the employee's safety or the safety of fellow employees.

5. REPORTING OF CRIMINAL CONVICTIONS – It is the employees responsibility to report any criminal conviction under a Federal, State, or Local law arising out of the use, possession, manufacture, distribution, or dispensing of drugs, controlled substances, or alcohol while on Company premises or in the conduct of Company business within five (5) days of such conviction. Failure to comply with this requirement will subject the employee to immediate discharge.

6. INSPECTION OF COMPANY AND EMPLOYEE PROPERTY- ENERGY ERECTORS, INC. reserves the right to inspect all Company property, including but not limited to desks and lockers, without prior notice to the employee. The Company also reserves the right to inspect all employee property, including motor vehicles, clothing, packages, briefcases, lunch boxes, containers, purses and the like, brought onto the Company's premises or any premises used by the Company, when there is reasonable cause to suspect that illegal drugs or alcohol may be present. Permission will be sought prior to the inspection of employee property. Employees are required to cooperate in all inspections: failure to cooperate will subject an employee to discipline, up to and including discharge.

7. TESTING- Employees and applicants are subject to testing for the presence of alcohol, drugs, or controlled substances. All testing will be at the discretion of the Company and in accordance with this Policy. Testing procedures are intended to protect individual privacy, ensure accountability and integrity of the specimens, and to provide confidentiality of test results. An employee's refusal to undergo a test or testing positive after a confirmatory test constitutes cause for immediate discharge. A job applicant's refusal to undergo a test or testing positive after a confirmatory test constitutes grounds for denying or revoking employment to the applicant.

All alcohol testing shall be conducted in accordance 440.102, Florida Stats., and 38F-9, Florida Admin. Code, the Division of Worker's Compensation rules and/or the Nuclear Regulatory Commission's Fitness-For-Duty Program Rules and Regulations (Part 26 of the Code of Federal Regulations) and be done by a laboratory licensed by the Florida Department of Health and Rehabilitative Services (DHRS). See Exhibit B for list. Test for alcohol shall be administered by blood analysis using an enzyme oxidation methodology. A blood alcohol content indicating a blood alcohol concentration of 0.05 g/dl percent or greater, which has been confirmed, will be considered a positive result. The confirmatory test for alcohol shall be done by gas chromatography analysis of the blood. Where a confirmatory test is performed directly on blood, one portion of the sample shall be kept secure and chemically stable and made available for verification of laboratory testing results. Employees will be notified of a positive confirmed test and will be allowed the rights noted below for a positive confirmed drug test. A confirmed positive test shall be cause for immediate discharge.

All drug testing procedures shall be in accordance with 440.102, Florida Stats. and 38F-9, Florida Admin. Code, the Division of Worker’s Compensation rules, and all tests shall be performed by a NIDA (National Institute of Drug Abuse) certified laboratory that is licensed by the DHRS. The initial tests will be done by a sensitive and reliable Flood and Drug Administration-approved immunoassay procedure. Employees and job applicants have the right to consult the testing laboratory for technical information regarding prescription and non-prescription medications.

At the time of collection, one urine sample will be taken. It will then be sent to the licensed laboratory and split into two portions. One will be used for testing and the other portion will be kept secure and chemically stable for at least 210 days and made available for verification of laboratory results if the test is a positive confirmatory test. When an initial drug test results in a positive test, a gas chromatography/mass spectrometry confirmation test will be used for verification. Employees or job applicants who test positive after the confirmatory test will be notified in writing of the result within five (5) working days by the company’s Medical Review Officer. The notice will include the result of the test, the consequences of the result, and the available options. Within five days of receipt of the positive confirmed test result, an employee or job applicant may explain or contest the result. If the employee’s explanation is unacceptable, the employee will be notified in writing within fifteen days and told why the explanation is unacceptable, along with the report of positive results. A confirmed positive test shall be cause immediate discharge. Employees who bring a civil or administrative action pursuant to 440.102, Florida, Stats., must notify the testing lab of that fact.

An employee testing positive shall have the right to have the secured portion of his/her urine or blood sample independently retested by a DHRS-licensed laboratory of his/her choice and at his/her expense up to 180 days after notice of the results. The employee’s retest at a laboratory must test at an equal or greater level of sensitivity. If the independent retest is negative, the employee shall be allowed to resume work immediately and be reimbursed for the cost of such independent tests.

8. DRUG TYPE AND CUT-OFF LIMITS- Employees may be tested for the following drugs and /or their metabolites at the following cut-off limits:

| DRUG TYPE/CLASS | SCREENING CUT-OFF LIMIT (ng/ml) | CONFIRMATION CUT-OFF LIMIT (ng/ml) |
|--|------------------------------------|---------------------------------------|
| AMPHETAMINES | 1000 | 500 |
| BARBITURATES | 300 | 150 |
| BENOYLECGONINE (Cocaine Metabolite) | 300 | 150 |
| CANNABINOIDS | 100 | 15 |
| METHAQUALONE | 300 | 150 |
| OPIATES | 300 | 300 |
| PHENCYCLIDINE (PCP) | 300 | 300 |
| BENZODIAZEPINES | 300 | 150 |
| METHADONE | 300 | 10 |

This list of drugs and cut-off limits are subject to change by the Company at its sole discretion, but subject to the law, as advances in technology or other considerations warrant identification of these and additional substances at other concentrations.

A qualified health professional will be available for consultation with employees/ applicants prior to testing. This will allow any employee/ applicant with medical problems, or on prescribed or over-the-counter medications (see Exhibit A), the opportunity to confidentially inform the health professional prior to testing. That information will be furnished to the licensed Laboratory when the specimen is transmitted to them and to the Company's Medical Review Officer.

9. APPLICANT SCREENING- Applicants being considered for employment shall be subject to pre-employment screening for drugs and alcohol as set forth above. Applicants may confidentially report the use of prescription or non-prescription medications which, may affect the results of the drug test (see Exhibit A) to the Company's Drug Program Coordinator. Applicants will be notified of a positive confirmed test within five working days and will be offered an opportunity to explain the result. If the applicant's explanation is unacceptable, the applicant will be notified in writing of the fact, and told why the explanation is unacceptable. The written notification from the Company will include the positive test result. A positive result from such screening tests shall be grounds for denying or revoking employment to the applicant. The Company may use a refusal to take a test as a basis for refusing to hire the applicant.

10. EMPLOYEE TESTING-

- a. Initial Testing: All employees, following the implementation of this Policy, shall be tested for alcohol, drugs, and controlled substances. Such initial workforce testing will allow the implementation of this Policy on a fair and uniform basis. Any employee who refuses to be tested will be subject to discipline up to and including discharge. An employee who tests positive shall be subject to immediate discharge, in accordance with Paragraph 7 above.
- b. Reasonable Suspicion: Employees will be tested in accordance with Paragraph 7 if there exists a "reasonable suspicion" that the employee is under the influence of, or impaired by, alcohol, a controlled substance, or other drug. The determination of reasonable suspicion, if reasonable possible, shall be made by two supervisors or other management authorized persons (when a second member of management is not reasonably available, one person shall be allowed to require testing.) The persons(s) making the determination of reasonable suspicion shall have a completed training as prescribed by the Employee Assistance Program (EAP). All tests shall be performed in accordance with this Policy. Refusal to submit to a management request for testing for the presence of alcohol or drugs shall constitute insubordination and be grounds for immediate discharge.

Supervisory personnel shall document any observations concerning the appearance, behavior, speech, or body odors of the employee. There may be a variety of observations, or unique observations, that may lead to a determination of reasonable suspicion including information gathered from other persons or sources. Observations leading to a determination reasonable suspicion include, but are not limited to any actions, behaviors or observations that the supervisory personnel believe to create a reasonable suspicion of drug or alcohol use.

- c. Employees shall be tested in accordance with Paragraph 7 for any accident or incident on Company premises, or off Company premises while conducting Company business or while on-duty, which results in personal injury or property damage where it is reasonable to suspect that human error could be at least in part an issue. Refusal to submit to a test for the presence of alcohol or drugs shall constitute insubordination and be cause for immediate discharge.
- d. Unannounced Random Testing: All employees are uniformly subject to unannounced random testing. The Company has discretion regarding when to randomly test. Such testing shall be performed in accordance with Paragraph 7. Refusal to submit to an unannounced random test for the presence of alcohol or drugs shall give rise to a presumption of intoxication or usage and such refusal shall also constitute insubordination and be cause for immediate discharge.
- e. Drivers and Motor Vehicle Operators: Drivers and motor vehicle operators subject to regulations by the Federal Department of Transportation or other agency and shall be subject to all Company policies. (Drivers are specifically referred to the Federal Motor Carrier Safety Regulations Part 383, Subpart D, 383.51, 583.72; Part 391, Subpart A, 392.4 through 392.5, which parts are incorporated by reference into this Policy, subject to the following sentence.) To the extent the Company Policy is more strict or specific than a government regulation, the Company Policy shall control, unless expressly preempted by law.
- f. Employees working in nuclear power facilities- Employees subject to regulations of the Nuclear Regulatory Commission, 10 Code of Federal Regulations Part 26, or another agency and shall be subject to all Company policies. To the extent the Company Policy is more strict or specific than a government regulation, the Company Policy shall control, unless expressly preempt by law.

g. Routine fitness-for-duty testing- all employees must to testing done as part of routinely scheduled employee fitness-for-duty medical examinations. These are part of the Company's established policy and are scheduled routinely for all members of an employment classification or group.

h. Follow-up testing- Employees who enter an employee assistance program for drug related problems, or an alcohol and drug rehabilitation program, must submit to a test as a follow-up to the program. Employees must also submit to an unannounced drug tests on a monthly, semi-annual, or annual basis for up to two years.

11. LEAVING THE WORK SITE- during an investigation involving the use or possession of drugs or alcohol or once a determination of reasonable suspicion has been made, an employee shall not leave the work site without approval, and shall leave in the manner determined by management. Failure to remain on site, or knowingly assisting another employee in leaving the site without authorization by management, shall be considered insubordination, improper conduct, and shall be cause for immediate discharge.

12. TREATMENT/EMPLOYEE ASSISTANCE PROGRAM- The Company recognizes that drug and alcohol dependency is a treatable health problem. Employees needing assistance in dealing with such a problem or dependency are encouraged to consult with management or the Company's Drug Program Coordinator to obtain information on the availability of assistance resources, treatment clinics and programs. Costs of treatment in excess of these covered by ENERGY ERECTORS, INC. Health and Welfare Plan shall be the responsibility of the employee.

The Company encourages treatment for any drug or alcohol dependency and this Policy is implemented to encourage employees with health problems to seek treatment before their jobs are in jeopardy or the safety, health and security of the work environment is put at risk. However, once an employee is in a job jeopardy status, subsequent treatment may not be considered a mitigating factor.

The Employee Assistance Program (EAP) will be available to all active employees. Details of the EAP are available through the Company's Drug Program Coordinator and information provided to employees. All inquiries to the EAP will be considered confidential. The EAP allows for employees to seek treatment or counseling and provides:

- a. Education and training, concerning substance abuse, for employee and supervisors
- b. Reference sources for the employee, often times coordinated with any benefits available to the employee, including any insurance benefits and use of sick leave; and
- c. A confidential support system through the workplace for employees who avail themselves to treatment prior to creating a job jeopardy status.

13. RE-EMPLOYMENT ELIGIBILITY/RE-ENTRY INTO THE WORKFORCE- An employee who has been terminated for a positive test must provide objective evidence satisfactory to the Company's Medical Review Officer that the employee has been rehabilitated and must test negative prior to being eligible for

rehire. Any such employee shall be given one opportunity to demonstrate eligibility for rehire and will have 60 days (or longer if approved by the Company's MRO) from the date of the employee's termination to do so. However, under no circumstances will the Company be under any obligation or requirement to rehire any employee terminated for a positive drug or alcohol test.

An employee terminated for a positive test who has successfully demonstrated eligibility for rehire, and is rehired, shall be subject to follow-up monthly drug and alcohol testing as determined by the Company and in compliance with this policy for a period of one (1) year (at the Company's discretion, up to 60 months for employees subject to the Federal Motor Carrier Safety Regulations) from the employee's date of rehire. All such testing will be done at the employer's expense. A positive confirmed test during the one (1) year period will result in immediate discharge and the employee will be ineligible for rehire.

Any employee who leaves the Company either through layoff, resignation, termination, or disability for a period exceeding 60 days will be subject to the same testing as a new applicant prior to re-entry into the workforce. ENERGY ERECTOR'S INC. will not rehire any individual who fails to pass any alcohol or drug test.

14. SECOND CONFIRMED POSITIVE TEST- Any employee, who having once tested positive for drugs or alcohol, shall upon a second confirmed positive test be immediately discharged and will be ineligible for rehire.

15. PROGRESSIVE DISCIPLINE NOT APPLICABLE- progressive discipline (e.g., verbal warning, written reprimand, termination) does not apply to violations of the Drug and Alcohol Policy shall be governed solely by the provisions set forth herein.

16. CONDITION OF EMPLOYMENT- Compliance with ENERGY ERECTORS, INC. Comprehensive Drug and Alcohol Abuse Policy is a condition of employment. With regard to this Policy any failure or refusal of an employee to cooperate fully, sign any required document, submit to any test, or follow any prescribed course of substance abuse treatment will be grounds for immediate termination.

17. IMPLEMENTATION- The implementation of this Policy becomes a part of the personnel policies for the Company and does not alter the employment-at-will status of its employees or does it create an express or implied contract in the employment relationship. Your employment may be terminated by you, or the Company, at any time with or without cause or reason.

18. CONFIDENTIALITY- All information regarding drug tests results are confidential. Information may be released only by written consent voluntarily signed by the person tested, unless release is compelled by a hearing officer or a court of competent jurisdiction pursuant to an appeal, or a professional licensing board deems it appropriate in a related disciplinary proceeding.

OVER-THE-COUNTER AND PRESCRIPTION DRUGS WHICH COULD ALTER OR AFFECT THE OUTCOME OF A DRUG TEST

EXHIBIT A

ALCOHOL

All liquid medications containing ethyl alcohol (ethanol). Please read the label for alcohol content. As an example, Vick's Nyquil is 25% (50 proof) ethyl alcohol, Comtrex is 20% (40 proof), Contac Severe Cold Formula Night Strength is 25% (50 proof) and Listerine is 26.9% (54 proof).

AMPHETAMINES

Obetrol, Bihetamine, Desoxyn, Dexedrine, Didrex

CANNABINOIDS

Marinol (Dronabinol, THC)

COCAINE

Cocaine HCl topical solution (Roxanne)

PHENCYCLIDINE

Not legal by prescription

METHAQUALONE

Not legal by prescription

OPIATES

Paregoric, Parepectolin, Donnagel PG, Morphine, Tylenol with Codine, Empirin with Codine, APAP with Codine, Aspiring with codine, Robitussin AC, Guiatuss AC, Novahistine DH, Novahistine Expectorant, Dilaudid (hydromorphone), M-S Contin and Roxanol (morphine sulfate), Percodan, Cocodin, etc.

BARBITUATES

Ativan, Azene, Clonopin, Dalmane, Diazepam, Librium, Xanax, Serax, Tranxene, Valium, Verstran, Halcion, Paxipam, Restoril, Centrax.

METHADONE

Dolophine, Methadose

PROPOXYPHENE

Darvocet, Darvon N, Dolene, etc.

LIST PRESCRIPTION DRUGS TAKEN WITHIN THE PAST 30 DAYS. THIS IS FOR YOUR USE ONLY AT THIS TIME.



TEMPORARY FIELD EMPLOYEE

I, _____, acknowledge receipt of, read, understand, and agree to abide by the ENERGY ERECTORS, INC. Comprehensive Drug and Alcohol Abuse Policy dated January 1, 1994.

X _____ Date _____

X _____ (SSN) _____

Please sign and return to the Payroll Department.

