

State of Rhode Island and Providence Plantations  
Department of Administration  
Division of Purchases

**RIVIP BIDDER CERTIFICATION COVER FORM**

**SECTION 1 - BIDDER INFORMATION**

*Bidder must be registered as a vendor on the RIVIP system at [www.purchasing.ri.gov](http://www.purchasing.ri.gov) to submit a bid proposal.*

**Solicitation Number:** 7549957A1  
**Solicitation Title:** HEATING, VENTILATION AND AIR CONDITIONING SERVICES & REPAIR (MPA-136) -  
ADDENDUM 1 (9 PGS)  
**Bid Proposal Submission  
Deadline Date & Time:** 11/2/2015 11:30 AM  
**RIVIP Vendor ID #:** 29418  
**Bidder Name:** Arden Engineering Constructors, LLC  
**Address:** 505 Narragansett Park Dr  
Pawtucket, RI 02861  
USA  
**Telephone:** (401) 727-3500  
**Fax:** (401) 727-3540  
**Contact Name:** Jeffery Potter  
**Contact Title:** Director of Sales and Service  
**Contact Email:** jpotter@ardeneng.com

**SECTION 2 —DISCLOSURES**

**Bidders must respond to every statement. Bid proposals submitted without a complete response may be deemed nonresponsive.**

*Indicate "Y" (Yes) or "N" (No) for Disclosures 1-4, and if "Yes," provide details below. Complete Disclosure 5. If the Bidder is publicly held, the Bidder may provide owner information about only those stockholders, members, partners, or other owners that hold at least 10% of the record or beneficial equity interests of the Bidder.*

- N 1. State whether the Bidder, or any officer, director, manager, stockholder, member, partner, or other owner or principal of the Bidder or any parent, subsidiary, or affiliate has been subject to suspension or debarment by any federal, state, or municipal governmental authority, or the subject of criminal prosecution, or convicted of a criminal offense within the previous 5 years. If "Yes," provide details below.
- N 2. State whether the Bidder, or any officer, director, manager, stockholder, member, partner, or other owner or principal of the Bidder or any parent, subsidiary, or affiliate has had any contracts with a federal, state, or municipal governmental authority terminated for any reason within the previous 5 years. If "Yes," provide details below.
- N 3. State whether the Bidder, or any officer, director, manager, stockholder, member, partner, or other owner or principal of the Bidder or any parent, subsidiary, or affiliate has been fined more than \$5000 for violation(s) of any Rhode Island environmental law(s) by the Rhode Island Department of Environmental Management within the previous 5 years. If "Yes," provide details below.

- N 4. State whether any officer, director, manager, stockholder, member, partner, or other owner or principal of the Bidder is serving or has served within the past two calendar years as either an appointed or elected official of any state governmental authority or quasi-public corporation, including without limitation, any entity created as a legislative body or public or state agency by the general assembly or constitution of this state.
5. List each officer, director, manager, stockholder, member, partner, or other owner or principal of the Bidder, and each intermediate parent company and the ultimate parent company of the Bidder. For each individual, provide his or her name, business address, principal occupation, position with the Bidder, and the percentage of ownership, if any, he or she holds in the Bidder, and each intermediate parent company and the ultimate parent company of the Bidder.

Disclosure details (continue on additional sheet if necessary):

Robert M Bolton - Owner, CEO Arden Building Companies - Parent Company

Robert M Bolton - Owner, CEO Arden Engineering Constructors, LLC

Kenneth Demers - Senior VP, Arden Engineering Constructors, LLC

Gordon Fletcher - CFO, Arden Engineering Constructors, LLC.

Jeffery Potter - VP, Arden Engineering Constructors, LLC.

John Puniello - VP, Arden Engineering Constructors, LLC.

### SECTION 3 —CERTIFICATIONS

**Bidders must respond to every statement. Bid proposals submitted without a complete response may be deemed nonresponsive.**

Indicate "Y" (Yes) or "N" (No), and if "No," provide details below.

**THE BIDDER CERTIFIES THAT:**

- Y 1. The Bidder will immediately disclose, in writing, to the State Purchasing Agent any potential conflict of interest which may occur during the term of any contract awarded pursuant to this solicitation.
- Y 2. The Bidder possesses all licenses and anyone who will perform any work will possess all licenses required by applicable federal, state, and local law necessary to perform the requirements of any contract awarded pursuant to this solicitation. In the event that any required license shall lapse or be restricted or suspended, the Bidder shall immediately notify the State Purchasing Agent in writing.
- Y 3. The Bidder will maintain all required insurance during the term of any contract pursuant to this solicitation. In the event that any required insurance shall lapse or be canceled, the Bidder will immediately notify the State Purchasing Agent in writing.
- Y 4. The Bidder understands that falsification of any information in this bid proposal or failure to notify the State Purchasing Agent of any changes in any disclosures or certifications in this Bidder Certification may be grounds for suspension, debarment, and/or prosecution for fraud.
- Y 5. The Bidder has not paid and will not pay any bonus, commission, fee, gratuity, or other remuneration to any employee or official of the State of Rhode Island or any subdivision of the State of Rhode Island or other governmental authority for the purpose of obtaining an award of a contract pursuant to this solicitation. The Bidder further certifies that no bonus, commission, fee, gratuity, or other remuneration has been or will be received from any third party or paid to any third party contingent on the award of a contract pursuant to this solicitation.
- Y 6. This bid proposal is not a collusive bid proposal. Neither the Bidder, nor any of its owners, stockholders, members, partners, principals, directors, managers, officers, employees, or agents has in any way colluded, conspired, or agreed, directly or indirectly, with any other bidder or person to submit a collusive bid proposal in response to the solicitation or to refrain from submitting a bid proposal in response to the solicitation, or has in any manner, directly or indirectly, sought by agreement or collusion or other communication with any other bidder or person to fix the price or prices in the bid proposal or the bid proposal of any other bidder, or to fix any overhead, profit, or cost component of the bid price in the bid proposal or the bid proposal of any other bidder, or to secure through any collusion, conspiracy, or unlawful agreement any advantage against the State of Rhode Island or any person with an interest in the contract awarded pursuant to this solicitation. The bid price in the bid proposal is fair and proper and is not tainted by any collusion, conspiracy, or unlawful agreement on the part of the Bidder, its owners, stockholders, members, partners, principals, directors, managers, officers, employees, or agents.
- Y 7. The Bidder: (i) is not identified on the General Treasurer's list created pursuant to R.I. Gen. Laws § 37-2.5-3 as a person or entity engaging in investment activities in Iran described in § 37-2.5-2(b); and (ii) is not engaging in any such investment activities in Iran.
- Y 8. The Bidder will comply with all of the laws that are incorporated into and/or applicable to any contract with the State of Rhode Island.





STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Administration  
DIVISION OF PURCHASES  
One Capitol Hill  
Providence, RI 02908-5855

Tel: (401) 574-8100  
Fax: (401) 574-8387  
Website: www.purchasing.ri.gov

October 23, 2015

**ADDENDUM NUMBER ONE**

**RFQ # 7549957**

**TITLE: Heating, Ventilation and Air Conditioning Services & Repair  
(MPA-136)**

**Closing Date and Time: 11/2/15 at 11:30 AM**

**Per the issuance of this ADDENDUM # (1), (9) pages, including this cover sheet.**



**Specification Change /Addition / Clarifications**

**Questions and Answers received for this Solicitation:**

- 1. Q. The spread sheet is very confusing and seems to be aligned wrong?**

**Response: Use the attached Bid Form in place of the form shown in Section 18: Financial Consideration and Section 19 Pricing. All other forms must be completed by the vendor. BE SURE to include the attached five (5) pages on your public copy CD.**

- 2. Q. In section 3.12 it states that contractors must receive prior approval on all projects. Does this include emergency calls? What is considered prior approval is a written purchase order necessary or verbal approval?**

**Response: No work shall commence without a Purchase Order. Emergency services are evaluated on a case by case basis. The State reserves the right to notify the user agency notice to proceed without a Purchase Order where life and safety circumstances occur.**

**Prompt Payment Discount Form**  
(Invoice discounts for receiving fast payments)

Note: All vendors responding to the within solicitation must complete a Prompt Payment Discount ("PPD") form as part of this Master Price Agreement solicitation.

Bidder Name: Arden Engineering Constructors, LLC  
RFQ/RFP Bid Solicitation Number: 1549957

**Prompt Payment Discounts ("PPD").** Vendors benefit from PPD by increased, usable cash flow as a result of fast and efficient payments for commodities or services rendered. ACH payments increase the prompt pay benefit by ensuring that funds are paid directly to their designated bank accounts, thus eliminating the delay of check clearance policies and traditional mail lead time (additional form required for ACH enrollment can be found at <http://controller.admin.ri.gov/Forms/index.php>). Vendors are highly encouraged to enroll and will receive consideration for enrollment.

The State benefits because contractors reduce the cost of products and services through the applied discount. While Bidders/Contractors have flexibility in determining the actual % discount(s) offered to the State, the discount(s) must be identified in 10 days or more for Payment Issuance Date. The State may use the prompt pay discounts submitted as a basis for selection and may negotiate discounts as deemed in the best interest of the State.

All discounts offered will be automatically deducted from payment when the issue date is within the specified number of days listed below and in accordance with the State's Prompt Payment Law. Payment days will be measured **from** the date goods are received and accepted/performance was completed OR the date an invoice is received by the Office of the DOA Controller, whichever is later **to** the date the payment is issued via ACH or mailed by the State Treasurer. The date of payment "issue" is the date a payment is considered "paid" not the date a payment is "received" by a vendor.

The State encourages Vendors to use the RIFANS Supplier Portal which has the functionality to electronically submit invoices against open Purchase Orders. This eliminates mailing and handling time and will increase the payment cycle especially for those suppliers who offer Prompt Payment Discounts.

Enter the Prompt Payment Discount percentage (%) off the invoice payment, for each of the payment issue dates listed, if the payment is issued within the specified Payment Issue days. For example:

- 5% - 10 Days
- 4% - 15 Days
- 3% - 20 Days
- 1% - 25 Days

Discount %	Payment Issue Date Within
5 %	10 Days
3 %	15 Days
2 %	20 Days
0 %	25 Days
By checking this box, we certify that we will not offer any Prompt Payment Discounts <input type="checkbox"/>	
We will sign up for ACH payment. (please circle response) <input checked="" type="radio"/> Yes <input type="radio"/> No	
We will utilize the State's Supplier Portal to electronically submit invoices. (please circle response) <input checked="" type="radio"/> Yes <input type="radio"/> No	

Signature: [Handwritten Signature]

Date: 11/2/15

1911

1911

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    - MBE Letter
- Statement of Years in Business

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- 24/7 Contact Information
- Safety Manual with Confined Space Certifications
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## **COMPANY PROFILE**

### **General**

Arden Engineering Constructors, LLC is a full service Mechanical Contracting Firm. The firm is divided into three divisions:

- **Engineering & Design**
- **Construction**
- **Service**

Arden Engineering Constructors, LLC has been the Rhode Island area's premier mechanical contractor for more than fifty years. Our capabilities cover the building owner's complete range of mechanical needs ranging from engineering/design, installation, ongoing maintenance, and repair of HVAC, Plumbing, Fire Protection, Testing and Balancing, Electrical and Automated Building Control Systems.

### **Engineering & Design**

Arden Engineering Constructors, LLC features an in house Engineering & Design Division. This division is headed up by Tim Elliott. Mr. Elliott is a licensed professional engineer in the states of Massachusetts, Rhode Island, New Hampshire, Connecticut, and California. Mr. Elliott has over 18 years of experience in the engineering consulting industry working for companies in both the Rhode Island and Boston, Massachusetts areas. He is a current member of the Boston ASHRAE, ASPE and ISPE chapters and a LEEP Accredited Professional (AP) Mr. Elliott's engineering and design skills were developed thru the years due to his dedication to the industry, desire to fulfill customer needs, and constant stride for improvement.

The in house Engineering & Design Division has a total of three people in the department; (1) Engineer, and (2) HVAC Designers. In order to provide full service Mechanical/Electrical/Plumbing (MEP) capabilities, ARDEN has made allegiances with outside consultants for plumbing & electrical engineering. As the needs in the market increase the Engineering & Design Division will grow to support the customer base. It is hopeful that the department will double in size over the next couple of years. Our



current major client base includes Roger Williams & Brown University, Millipore, Abbott Laboratories, FM Global, Twin River and a sub-consultant for Parsons Corp.

The in-house design and engineering capabilities can provide customers with turnkey solutions utilizing a design/build or plan/spec approach. In order to satisfy the customer's needs, the engineering division will provide the quick responses that are needed along with ensuring that the chosen solution meets or exceeds all applicable codes. The engineering division can provide the following services:

- **Drawings & Specifications – Design/Build or Plan/Spec**
- **LEED - AP Services**
- **3D Modeling**
- **Engineering Reports – Code Studies, Energy Analysis**
- **Cost Estimating**
- **Construction Administration**
- **Commissioning and Start-Up (Utilizing our in-house balancing department)**
- **Forensic Engineering/Trouble Shooting of existing HVAC systems**

### Construction

Our comprehensive range of expertise has earned us the contractor of choice for some of the area's largest high profile projects, such as The Providence Place Mall, Providence Public Safety Complex, CVS and Amica Insurance World Headquarters, University of Rhode Island Sports Complex, TF Green Airport, AMGEN Pharmaceutical Plant as well as major building restoration projects, such as The URI Shepherd Building, Old Union Station Buildings, and Blue Cross/Blue Shield's Empire Street and One Reservoir Avenue Place projects. Other areas of Arden's expertise include the construction of Waste Water Treatment and Water Plants (WWTP). Most of mechanical piping for the large waste water and water treatment plants in the Rhode Island and nearby Massachusetts and Connecticut areas are typically constructed by Arden.

Within the construction group Arden has the following sub-divisions:

- **Electrical**
- **Controls**
- **Fire Protection**



## **Electrical**

The electrical group includes (5) Project Managers that provide installations for new construction projects and/or owner direct projects. The electrical group also has the capability to review existing electrical installations to determine if adequate power is available to support any new changes that may be needed. This is usually a necessity in order to provide a full engineering assessment of a building. They also provide support as needed to the engineering and balancing & commissioning groups to help with the decision process along with recommendations to a building owner if substantial electrical re-work is needed to support the HVAC recommended solutions. If detailed electrical engineering documents or design is needed, Arden has electrical engineer sub-contractors that can provide fully engineering stamped biddable documents.

## **Controls**

Arden's in-house controls group is a licensed Johnson Controls dealer that can provide turn-key controls package for building owners. The controls group provides support primarily to the construction & service groups within the company. As part of the construction group they are involved in most new Arden construction projects providing the design, installation of field devices, programming and commissioning required for new systems. As part of the Service group they get more involved with troubleshooting of existing systems along with the retrofit of existing control systems. The controls group has a wide variety of experience with control devices including DDC, electronic and pneumatic. They have the ability to install all control manufacture's field devices and wiring but currently only licensed to program Johnson Metasys systems. Any programming required on other control systems can be sub-contracted thru Arden to still provide a single source responsibility to building owners.

## **Fire Protection**

The fire protection group provides design and installation for building fire suppression systems to support the construction group and their own clientele. The in-house group provides all of the piping design on ACAD and then fabricates the piping in the adjacent fabrication shop. The group has the capability to perform hydraulic calculations and provide stamped drawings for permit. The fire protection group is well known throughout the state and has good relationships with local fire marshals.



## **Service**

Concerning ongoing maintenance, service and repair, Arden has been entrusted with the day-to-day service, maintenance, repair and installation for high-profile customers such as Reebok World Headquarters, Hasbro Inc., Salve Regina University and the State of Rhode Island, encompassing over 40 individual properties with a variety of equipment. To date, Arden performs this type of service for more than 80 customers. The service techs along with day to day maintenance work also are involved with system start-up of newly constructed systems along with troubleshooting existing installations. Once a problem is identified to require engineering support, then the project is handed over to the engineering division. At this point an engineering assessment is performed along with testing & measurement of the systems is done by the balancing department as described in more detail in the Balancing & Commissioning paragraph.

## **HVAC System Balancing & Commissioning**

The balancing & commissioning department services all three divisions of the company. The group is NEBB certified and has a total of (4) four balancers. The balancing department is either setting up new systems for the construction group, re-balancing or re-commissioning existing systems for the service group or troubleshooting system performance for the engineering division. With in-house balancing & commissioning Arden can perform full diagnostics of buildings to determine solutions for problem areas or provide recommendations on how to improve system operation to obtain maximum energy savings. When teamed up with the engineering division, Arden has the ability to troubleshoot systems, provide and engineering assessment of the system, and then implement the fixes to the system either thru a plan/spec or design/build process. Along with servicing the needs of Arden, the balancing department also has their own clientele of facility owners, commissioning agents, contractors



# Arden Engineering Building Services

**Our Mission Statement:** To deliver world-class customer and employee satisfaction by providing superior customer support and service solutions for the maintenance and repair of all commercial building systems.

Services provided by Arden Engineering include the following:

- Heating, Ventilation, Air-conditioning
- Mechanical Construction
- Mechanical System Design, Installation, Service
- Equipment Replacement, Upgrade, & Repair
- Planned Maintenance Programs
- 24 Hour Service
- NEBB Testing & Balancing
- Fire Protection Systems and Services
- Direct Digital Control System Design, Installation & Services
- Plumbing Installation
- Fabrication Plant
- Electrical Services and Installation
- Master Pipe Fitters and ASME certified Welders
- Master 1 Oil Burner Technicians and Stationary Engineers
- Licensed Professional Engineering

**Sprinkler Inspection and Repair Service:** Arden can provide sprinkler testing and repair services that will keep your building in compliance with National Fire Protection Association (NFPA) recommendations for annual maintenance and inspection. It will also provide you with peace of mind, knowing that your building and its occupants are protected and the sprinkler system is operating as designed.

**Fire Alarm Services:** Arden can provide fire alarm system testing and repair services that will keep your building in compliance with National Fire Protection Association (NFPA) recommendations for annual maintenance and inspection. Our scheduled, planned service by licensed electricians will provide you with the necessary documentation for compliance with NFPA and insurance regulations. It will also provide you with peace of mind, knowing that your building and its occupants are protected and the fire alarm system is operating as designed.

**Testing, Adjusting & Balancing Services:** Arden is NEBB (National Environmental Balancing Bureau) certified with members of NEBB on staff. We offer in-depth air and water balancing services that relieve an aging building of its hot and cold spots, often without a large commitment of time or money by the building's owner. We can re-commission a building to bring it back to original specifications and make recommendations on how to make it operate more efficiently. The result is savings in energy and operating costs, and improvement in occupant comfort and productivity, all at the same time.

**Design / Build Services:** Arden's in-house engineering team provides building mechanical solutions that meet the latest codes for energy efficiency, occupant comfort and cost effectiveness. We help customers whose building's use and space requirements may have changed due to expansion or change of use. We also offer design / build solutions that can minimize project costs and time lines.

**Electrical Services Division:** Arden's electrical division offers licensed, trained electricians to solve your building's electrical needs. Whether your building needs an upgrade to its power service, electrical installation, renovation of space or new construction, we can design, construct and maintain your building's electrical system. We have an in-house electrical division large enough to meet any building's changing electrical demands.

**Arden Service** is committed to partnering with you to provide the services you need to make your building operate efficiently, safely and productively. We want to save you time and money. One call to Arden service will begin to solve all your building's problems. Call **1-866-GO-ARDEN** to find out more about 'What We Can Do For Your Building'.



**Bid # 7549957A1**

**HVAC MAINTENANCE & REPAIR SERVICE PROGRAM**

**MPA 136**

**11/2/15**

**11:30AM**

**ORIGINAL COPY**

Rhode Island Department of Administration

Division of Purchases, 2<sup>nd</sup> Floor

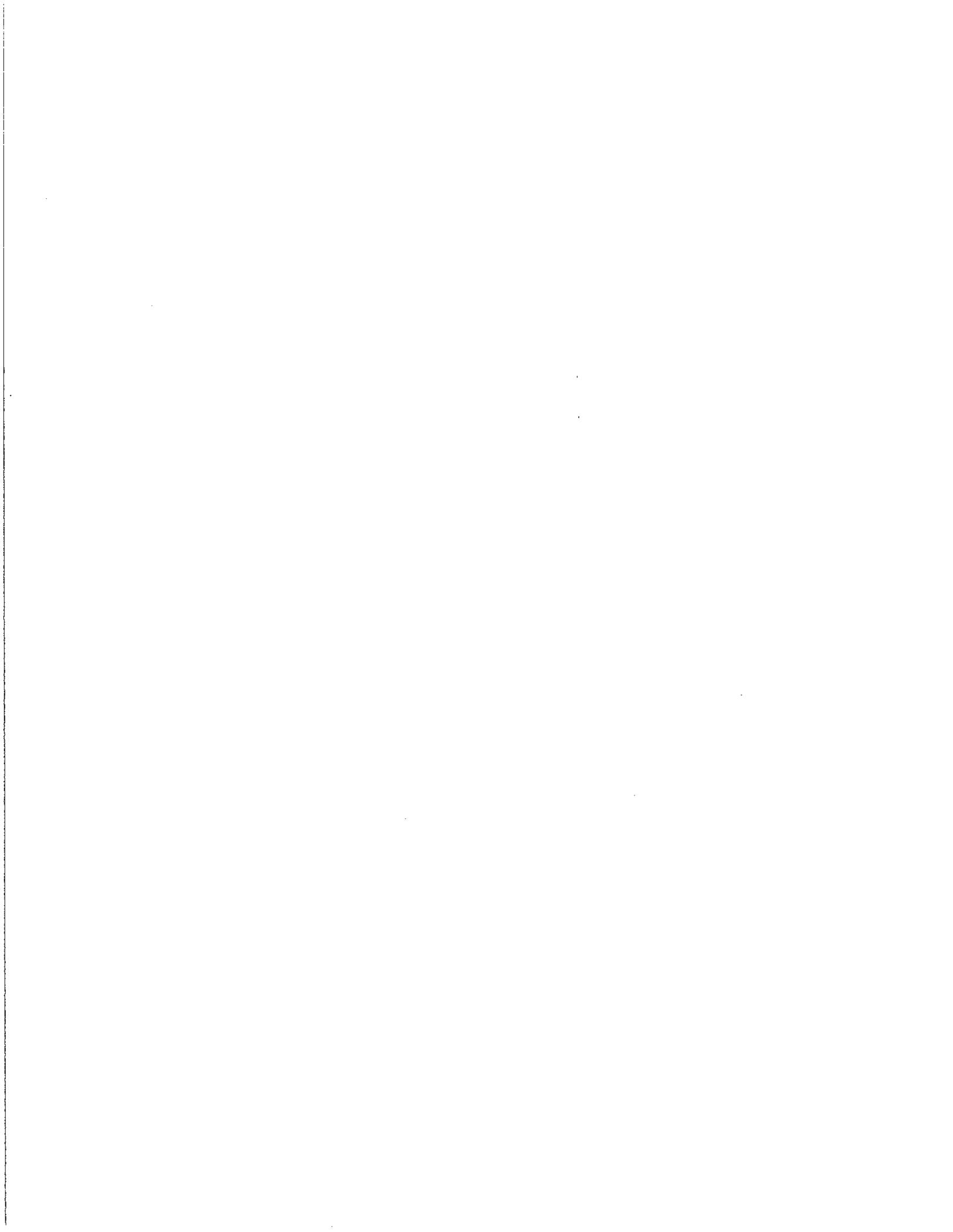
One Capitol Hill

Providence, RI 02908-5855

Arden Engineering Constructors, LLC

505 Narragansett Park Drive

Pawtucket, RI 02861



## Request for Taxpayer Identification Number and Certification

**Give Form to the  
requester. Do not  
send to the IRS.**

Print or type See Specific Instructions on page 2.	1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank. <b>Arden Building Companies, LLC</b>		
	2 Business name/disregarded entity name, if different from above <b>Arden Engineering Constructors, LLC</b>		
	3 Check appropriate box for federal tax classification; check only one of the following seven boxes: <input type="checkbox"/> Individual/sole proprietor or single-member LLC <input type="checkbox"/> C Corporation <input type="checkbox"/> S Corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Trust/estate <input checked="" type="checkbox"/> Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶ <b>P</b> <small>Note. For a single-member LLC that is disregarded, do not check LLC; check the appropriate box in the line above for the tax classification of the single-member owner.</small> <input type="checkbox"/> Other (see instructions) ▶		4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3): Exempt payee code (if any) _____ Exemption from FATCA reporting code (if any) _____ <small>(Applies to accounts maintained outside the U.S.)</small>
	5 Address (number, street, and apt. or suite no.) <b>505 Narragansett Park Drive</b>		Requester's name and address (optional)
	6 City, state, and ZIP code <b>Pawtucket, RI 02861</b>		
	7 List account number(s) here (optional)		

**Part I Taxpayer Identification Number (TIN)**

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I Instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

**Note.** If the account is in more than one name, see the instructions for line 1 and the chart on page 4 for guidelines on whose number to enter.

Social security number	
[ ] [ ] [ ] - [ ] [ ] - [ ] [ ] [ ]	OR
Employer identification number	
2 0 - 5 1 2 6 7 4 7	

**Part II Certification**

Under penalties of perjury, I certify that:

- The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
- I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
- I am a U.S. citizen or other U.S. person (defined below); and
- The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

**Certification instructions.** You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 3.

**Sign Here**    Signature of U.S. person ▶ *Jacqueline M Benoit*    Date ▶ *9-17-15*

**General Instructions**

Section references are to the Internal Revenue Code unless otherwise noted.

**Future developments.** Information about developments affecting Form W-9 (such as legislation enacted after we release it) is at [www.irs.gov/fw9](http://www.irs.gov/fw9).

**Purpose of Form**

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following:

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)

- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

*If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding? on page 2.*

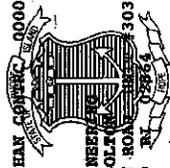
By signing the filled-out form, you:

- Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
- Certify that you are not subject to backup withholding, or
- Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and
- Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting?* on page 2 for further information.



State of Rhode Island and Providence Plantations  
Rhode Island Department of Labor and Training

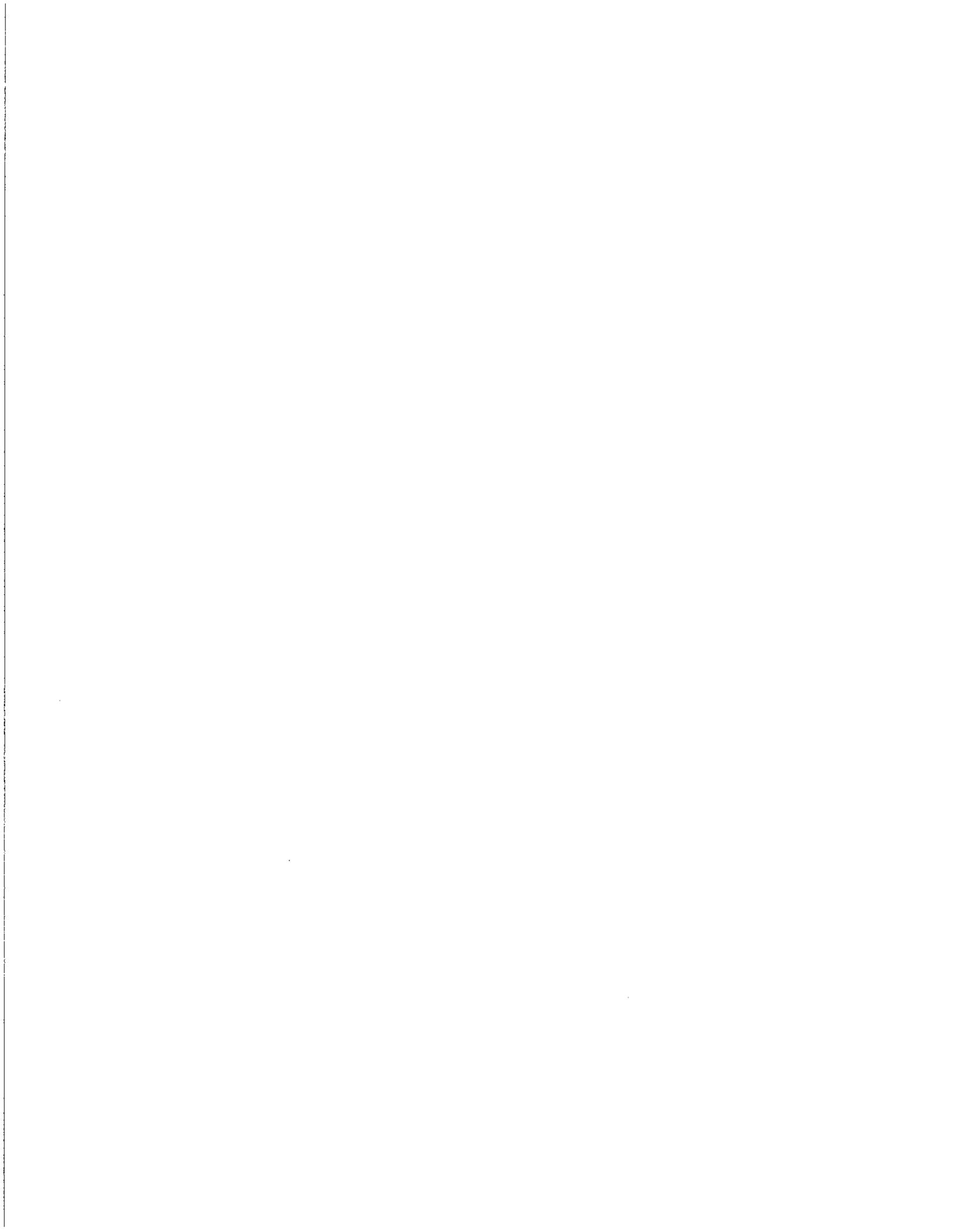
MASTER MECHANIC CENTER 00000105



ARDEN ENGINEERING  
ROBERT H BOLT  
500 WEDDON ROAD  
CUMBERLAND RI 02864

JOHN SEAW  
Administrator

09/30/2017  
Expiration Date





Rhode Island Department of Labor and Training  
Division of Workforce Regulation and Safety

**CONTRACTOR MASTER** CMP02272

**JOHN A PUNIELLO**  
23 KING PHILLIP AVENUE  
BRISTOL RI 02809

*Ronald R. Ambrose*  
Administrator

**11/30/2015**  
Expiration Date

Rhode Island Department of Labor and Training  
Division of Workforce Regulation and Safety

**CONTRACT MASTER/PIPE** 00007544

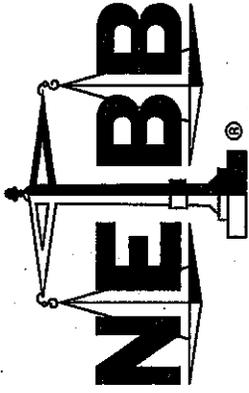
**JOHN A PUNIELLO**  
23 KING PHILLIP AVENUE  
BRISTOL RI 02809

*Ronald R. Ambrose*  
Administrator

**11/30/2015**



National Environmental Balancing Bureau



Recertification

THIS IS TO CERTIFY THAT

Arden Engineering Constructors, LLC  
in Pawtucket, RI

HAS MET ALL REQUIREMENTS FOR RENEWAL OF NEBB  
CERTIFICATION IN THE FOLLOWING DISCIPLINE

*Air & Hydronics Systems*

FOR THE BOARD OF DIRECTORS:

Exp. March 31, 2016

Arden Engineering Constructors, LLC/RI

No. 2807

NEBB Cert. No.

*R. Zander*

President

*James H. ...*

President-Elect



Creative Business Alternatives  
For Servicing the State of Rhode Island Properties

ARDEN ENGINEERING CONSTRUCTORS, LLC

ARDEN ENGINEERING CONSTRUCTORS, LLC is a full-service energy company capable of providing energy and related products and services. These services are designed to improve the State of Rhode Island's overall building operations and performance, indoor air quality and optimal cost efficiencies. ARDEN ENGINEERING would explore the feasibility of self-amortizing energy savings projects that might include energy efficient lighting, HVAC/chiller upgrades linked with utility rebate programs. In addition ARDEN ENGINEERING can provide energy savings performance services across a broad range of capabilities that are overviewed below.

ARDEN ENGINEERING'S Performance Contracting is the process for the sale, design, implementation, and long-term operation of projects which reduce facility related operating costs. Our business creates customized business solutions for the State of Rhode Island. A key to the success of this business is risk management. We have developed strategies to analyze and manage risks with respect to: (1) the appraisal process, (2) the construction process and (3) performance processes.

In each of the categories listed above, ARDEN ENGINEERING has integrated methods by which all risks are identified, analyzed, and mitigated in the development of a performance contracting solution. Given the level of experience ARDEN ENGINEERING has in long term guaranteed savings contracts, we have been able to optimize these methods in order to manage risks effectively and efficiently.

The risks associated with long-term performance based contracting are continuously considered throughout the Project cycle, from the first contact with the customer to the end of the last year of the contract term. This is done to insure the profitability and success of all of our projects for both ARDEN ENGINEERING and the State of Rhode Island. Furthermore, it is through continuous application of these risk management strategies that we are able to provide the basis for long term success in performance contracting.

Depending on the scope and nature of the measures being implemented in a specific project, energy savings guarantees are determined through a comprehensive investment grade energy audit. With certain parameters provided by the State of Rhode Island, ARDEN ENGINEERING is able to forecast and guarantee a level of savings which often covers the full cost of the installed equipment.

BUILD, OWN & OPERATE

ARDEN ENGINEERING can provide a total outsourced energy solution through our build, own and operate structure. Under this structure, ARDEN ENGINEERING would provide designated services to the State of Rhode Island. The services can include electricity, steam, hot water and HVAC as well as other critical building needs. The State of Rhode Island can concentrate on its core business while ARDEN ENGINEERING manages the infrastructure



and energy aspects of the operations. Services are performance-based to insure the highest level of quality and accountability. Under a build-own-operate scenario, ARDEN ENGINEERING would perform the following:

- complete turnkey design, engineering and construction services
- operation and maintenance of all systems and equipment
- staffing and human resource management
- around the clock emergency response
- procurement of all energy and related consumables
- full tracking and reporting of consumption and equipment performance, including electric substation and infrastructure as well as HVAC and other equipment

The structure has been successfully implemented in a number of applications including Coors Brewery, Harvard University, The Venetian Casino, and other projects. The primary benefits to the State of Rhode Island include:

- concentration on core business activities
- shifting risk to ARDEN ENGINEERING
- performance-based services and highest level of quality
- frees up capital for other uses

#### ENGINEERING CONSULTING SERVICES

ARDEN ENGINEERING will provide a full array of engineering and consulting services for all of the State of Rhode Island's energy related needs and can provide services in other areas, as well, such as environmental management. Our staff has extensive experience in the engineering, design, procurement and construction of energy projects ranging from small HVAC applications to large steam and power generation. With almost 100 years of experience in the energy industry, ARDEN ENGINEERING has the resources to provide whatever services are required for each facet of the project. ARDEN ENGINEERING consulting and engineering services include the following:

- mechanical and electrical design and/or design review for all electric and gas systems within the project to determine optimization of supply, utilization and monitoring of energy
- financial analysis for all energy related facets of the project
- procurement service to source and sell energy
- Interface with the local utility in expediting service and construction related matters
- electric and gas rate analysis to determine maximum rate benefits to the project
- HVAC design and feasibility analysis
- start-up, testing and commissioning services for equipment
- project and construction management
- environmental consulting
- permitting
- indoor air quality testing with regard to regulatory deregulation efforts and business implications

The benefit associated with ARDEN ENGINEERING consulting and engineering include:

- ARDEN ENGINEERING will be responsible for all energy related matters
- ARDEN ENGINEERING has 50 years experience in energy design, operation and construction
- ARDEN ENGINEERING understands how to design and manage complex energy projects



## BILLING AND ACCOUNTING

Through our Billing and Accounting services, ARDEN ENGINEERING can help the State of Rhode Island reduce its energy bills and related transaction costs. We can also improve the bill payment records and supply billing information to the State of Rhode Island in bundled and unbundled formats. We can also identify, recommend and implement viable energy management, control and procurement opportunities.

This approach is particularly appropriate under today's changing regulatory atmosphere where opportunities have already resulted for those who understand and are prepared with appropriate information. Those opportunities will multiply as deregulation progresses. Billing services could include the following:

- Load profiling for each facility
- Reports on suspect demand or usage billing
- Validation of billing and tariff status
- Recommendations regarding more economical tariff provisions
- Availability of incentive or off-tariff rate agreements
- Summary Reports on:
  - Energy per square foot
  - Energy usage per square foot
- Comparison of like facilities
- Summary of potential energy savings opportunities
- Available deregulation opportunities

Monthly reports can provide statistical analysis useful for budgeting, costs analysis, and site evaluation. Data allows for the comparison of usage and consumption during the life of a single facility or among similar facilities. Data is useful for evaluating the cost effectiveness of energy conservation programs already implemented as well as setting benchmarks for future programs.

## VALUE ADDED SERVICES

ARDEN ENGINEERING can make a number of value-added services available to the State of Rhode Island. Services that ARDEN ENGINEERING anticipates offering can be grouped into three areas: a) Operation and Maintenance Services; b) Energy Management Consulting Services, and c) Energy Efficiency Project Development.

### a) O&M Services

O&M Services include a wide array of field or shop based services that are often required by industrial or commercial clients in order to maintain and operate energy related infrastructure. Services can range from a technical assessment and solution design to an operating problem (technical consulting) or full scale operation and maintenance of facilities.

### b) Energy Management And Consulting Services

Energy Management Consulting Services include regulatory review, market research, efficiency benchmarking, and consolidated accounting.



- Regulatory review will track the pace and form of deregulation of the electric and gas industries and the continued regulation of transmission and distribution.
- Market research identify suppliers, prices, and terms in the deregulated market.
- Efficiency benchmarking help monitor and control the energy consumption at facilities.
- Consolidated billing and accounting functions will reduce the transaction costs associated with processing and paying energy bills. In the past, ARDEN ENGINEERING has been able to coordinate billing and accounting services with almost all customer information systems.

#### c) Energy Efficiency Project Development

Energy Efficiency Project Development services involve the development and implementation of projects that increase energy efficiency at the State of Rhode Island's facilities. ARDEN ENGINEERING can perform scoping or detailed facilities audits identifying opportunities to cost effectively manage energy utilization and provide the expertise to manage the implementation of such projects. Additionally, ARDEN ENGINEERING can recommend facility measurement and verification technologies to measure the effectiveness of installed energy efficiency measures.

Under a typical integrated management plan for property and energy management, property management personnel located at the customer sites would serve as key personnel to identify any necessary upgrades for site facility infrastructure or operating practices. Input from these key personnel would be utilized to identify the equipment or practices for which energy improvements may be useful. These opportunities for improvement would be analyzed for their energy conservation potential and estimates would be prepared of costs as well as payback. Projects with significant cost savings potential would be ranked, prioritized and matched against the strategic energy plan to implement a go-ahead plan. The site personnel would be kept informed and provided feedback on project status and economics to ensure their role in a successful project.



## **Financial Information**

Arden Engineering Constructors is widely considered to be southern New England's premier full- service Mechanical contractor. We are highly regarded for our expert installation and service of all critical building systems for more than fifty years.

We respect the States' need to know and be assured that the resource they choose is financially stable and is able to bring the resource required to deliver the contracted services. We wish to comply with providing the necessary documentation to demonstrate our financial stability but, feel it is not in our best interest to provide copies of our financial statements in a document that becomes a matter of public record. Please contact Arden Engineering's Chief Financial Officer, Gordon Fletcher at (401) 727-3500, extension 1600 to set up and appointment to review the required financial documents.





**Robert M Bolton**  
**Arden Building Companies**  
**CEO**

Laureen Gosselin  
Administrative &  
Project Assistant

John Conroy  
Director of Safety

Ken Demers  
Senior Vice President

Gordon Fletcher  
CFO

Jeff Potter, Vice Pres.  
Mechanical Service

SALES

Joseph Hoey

Katie Mellor

Ken Givens

Nora Benson

Bob Flaherty

SERVICE

Len Heroux  
Service Mgr.

Diana Cullen  
Cust. Svc. Coord.

Sheryl Rennick  
Cust. Svc. Coord.

Kerri Harnett  
Cust. Svc. Coord.

John Puniello, Vice Pres.  
Mechanical, Plumbing,  
Fire Protection Construction

MECHANICAL

Hal Sloane  
Sr. Proj. Mgr.

Waymon Jones  
Proj. Manager

David Demers  
Proj. Manager

Al Moreau  
MEP Coord./  
Fabrication

BIM

Eric Spurrer  
Sr. Proj. Mgr.

Ralph Gooch  
Sr. Proj. Mgr.

INDUSTRIAL

FIRE PROTECTION

Waymon Jones  
Sr. Estimator

ESTIMATING

Electrical  
Construction

Rob Cote  
Project Manager

TRAFFIC  
SIGNALING

Anthony Cardinal  
Project Manager

Tim Elliott, Director  
Engineering

Bill Cameron  
HVAC Designer  
BIM Manager

Mark Mastorio  
MEP  
Designer/Coord.

Jesse Leighton  
MEP  
Designer/Coord.

Fabrication Shop  
& Warehouse

Bill Lavole  
Back Shop &  
Delivery

Ed Larose  
Tool Critb

Mario Fontseca

Jacqueline Benoit,  
Acct. Mgr.  
Accounting Dept.

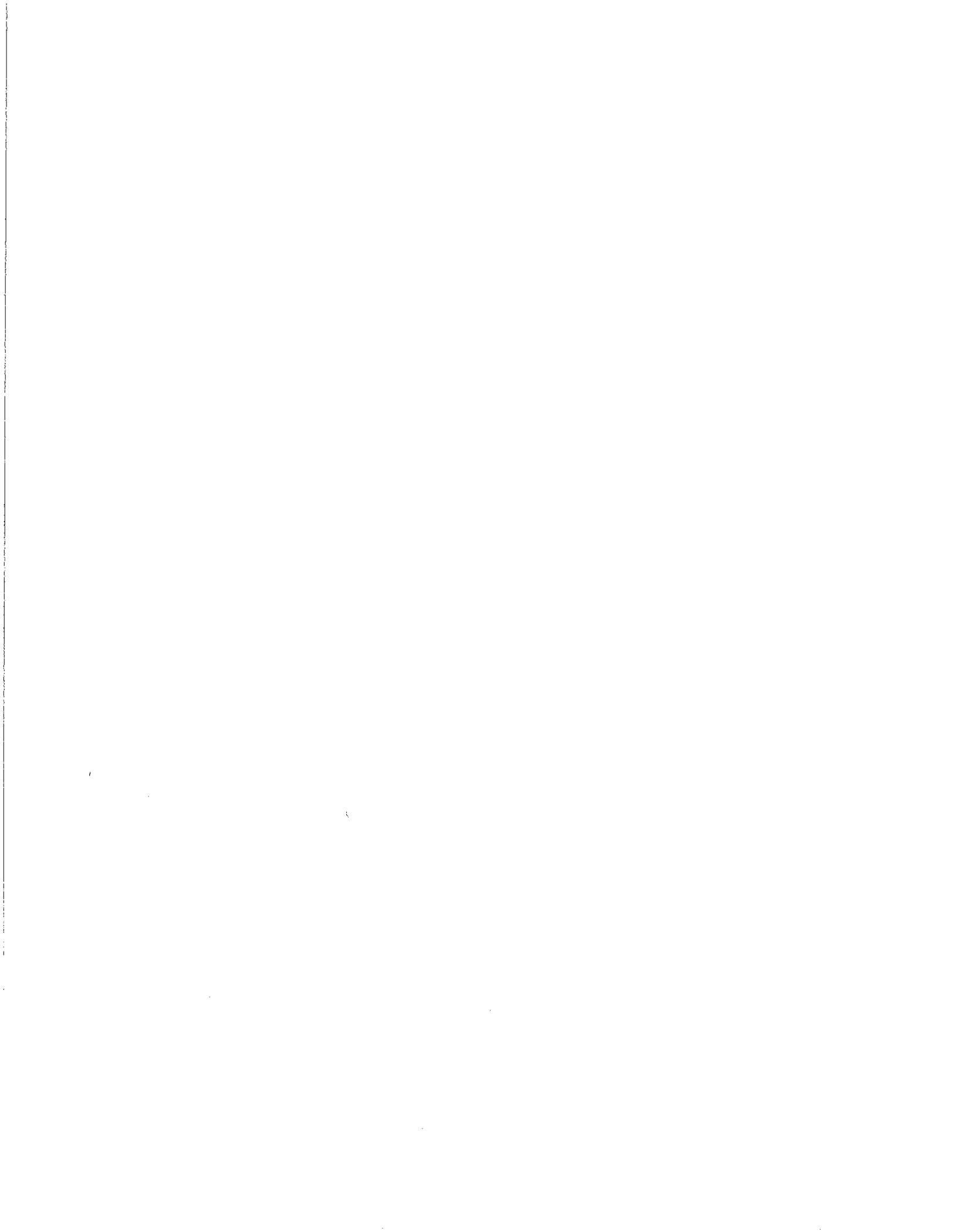
Dottie Lowe  
HR/Payroll

Joanne Hamilton  
Acct. Receivable

Christina Quirke  
Payroll Asst.

Karyn Kiryo  
Acct. Payable

Danielle Barnard  
Receptionist



**RESUME FORM (CS 95-1)**

**RESUME: (USE THIS FORM WHENEVER A RESUME IS REQUESTED)**

Complete this form for each Service Technician on your staff

Name: Aaron Iamarone s.s.# \_\_\_\_\_ (optional)

Title: HVAC Service Tech

Licenses Held: RI & MA Refrigeration Journeyman, Oil Burners, Sheetmetal Journeyman

Certificates Held: EPA Universal Certificate, OSHA - 10hour

Diploma Held: Associates of Applied Science (HVAC)

Courses Taken: Manitowic, Copeland, Ice-o-matic and Heatcraft

Years With Your Company: 3 year

Prior Employer: Johnson Controls

Years With Prior Employer: 1 1/2 years

Years Of Experience In Each Field: \_\_\_\_\_

Chiller Service: 3 year

High Pressure Boiler Services: 3 years

Plumbing: 0

Electrical: 10 years

Mechanical Equipment Service: 12 years

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**RESUME FORM (CS 95-1)**

**RESUME: (USE THIS FORM WHENEVER A RESUME IS REQUESTED)**

Complete this form for each Service Technician on your staff

Name: Aaron Smith s.s.# \_\_\_\_\_ (optional)

Title: HVAC Service Tech Apprentice

Licenses Held: RI & MA Refrigeration Apprentice

Certificates Held: EPA Certificate, Recovery Certificate, 410a Cert., Manitowic Field Service

Diploma Held: \_\_\_\_\_

Courses Taken: Manitowic Field Service

Years With Your Company: 4 years

Prior Employer: n/a

Years With Prior Employer: n/a

Years Of Experience In Each Field: 4 years

Chiller Service: 0

High Pressure Boiler Services: 0

Plumbing: 0

Electrical: 4 years

Mechanical Equipment Service: 4 years

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**RESUME FORM (CS 95-1)**

**RESUME: (USE THIS FORM WHENEVER A RESUME IS REQUESTED)**

Complete this form for each Service Technician on your staff

Name: Al Archetto s.s.# \_\_\_\_\_ (optional)

Title: HVAC Service Tech

Licenses Held: RI Refrigeration Journeyman RJ1, RI Pipefitter PJ1

Certificates Held: OSHA - 10hour

Diploma Held: \_\_\_\_\_

Courses Taken: Harsco Boilers, Cleaver Brooks Boilers

Years With Your Company: 10 years

Prior Employer: FG Lee's & Sons

Years With Prior Employer: 3 years

Years Of Experience In Each Field: 15 years

Chiller Service: 0

High Pressure Boiler Services: 10 years

Plumbing: 3 years

Electrical: \_\_\_\_\_

Mechanical Equipment Service: 15 years

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**RESUME FORM (CS 95-1)**

**RESUME: (USE THIS FORM WHENEVER A RESUME IS REQUESTED)**

Complete this form for each Service Technician on your staff

Name: Daniel Marland s.s.# \_\_\_\_\_ (optional)

Title: HVAC Service Tech Apprentice

Licenses Held: RI & MA Refrigeration Apprentice

Certificates Held: \_\_\_\_\_

Diploma Held: Bachelors of Finance - URI

Courses Taken: \_\_\_\_\_

Years With Your Company: 2 1/2 years

Prior Employer: n/a

Years With Prior Employer: n/a

Years Of Experience In Each Field: \_\_\_\_\_

Chiller Service: 2 years

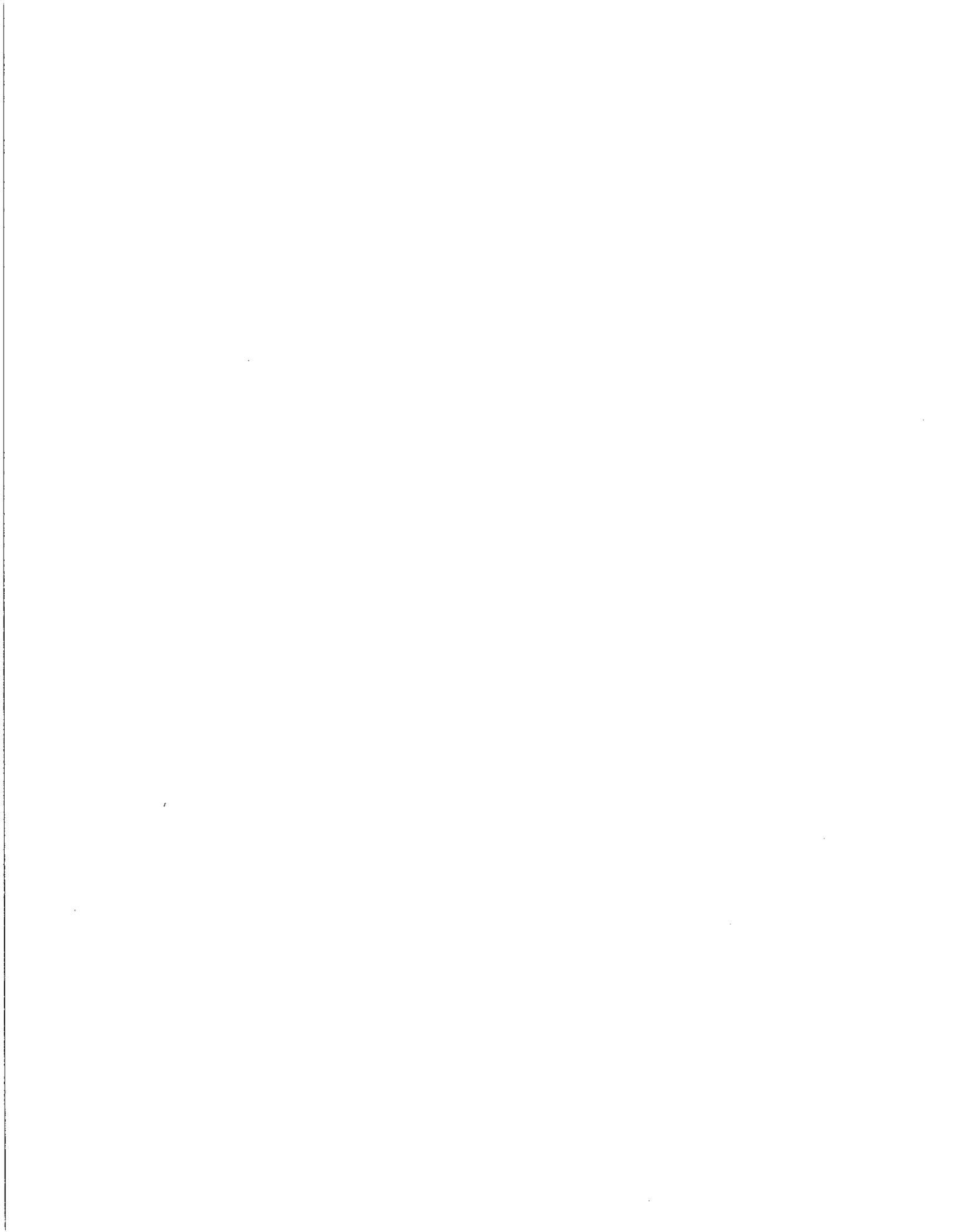
High Pressure Boiler Services: 2 years

Plumbing: 2 years

Electrical: 2 years

Mechanical Equipment Service: 2 years

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**RESUME FORM (CS 95-1)**

**RESUME: (USE THIS FORM WHENEVER A RESUME IS REQUESTED)**

Complete this form for each Service Technician on your staff

Name: Jason Zina s.s.# \_\_\_\_\_ (optional)

Title: HVAC Service Tech Journeyman

Licenses Held: RI & MA Refrigeration

Certificates Held: EPA Universal Certificate

Diploma Held: Associates in HVAC from NE Tech

Courses Taken: Harsco Patterson Kelly - Boiler Training

Years With Your Company: 5 years

Prior Employer: Scenesco Marine

Years With Prior Employer: 2 years

Years Of Experience In Each Field: 5 years Pipefitter, 5 years HVAC

Chiller Service: 5 years

High Pressure Boiler Services: 3 years

Plumbing: 0

Electrical: 0

Mechanical Equipment Service: 5 years

\_\_\_\_\_  
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## RESUME FORM (CS 95-1)

### RESUME: (USE THIS FORM WHENEVER A RESUME IS REQUESTED)

Complete this form for each Service Technician on your staff

Name: Joseph Pimentel s.s.# \_\_\_\_\_ (optional)

Title: HVAC Service Tech Apprentice

Licenses Held: RI & MA Refrigeration Apprentice

Certificates Held: EPA Type 1 & 2; R-410a safety and OSHA 10

Diploma Held: High School Diploma

Courses Taken: Manitowik Service Training

Years With Your Company: 3 year

Prior Employer: Allied

Years With Prior Employer: 3 year

Years Of Experience In Each Field: 3 years

Chiller Service: 3 years

High Pressure Boiler Services: 3 years

Plumbing: 0

Electrical: 1 year

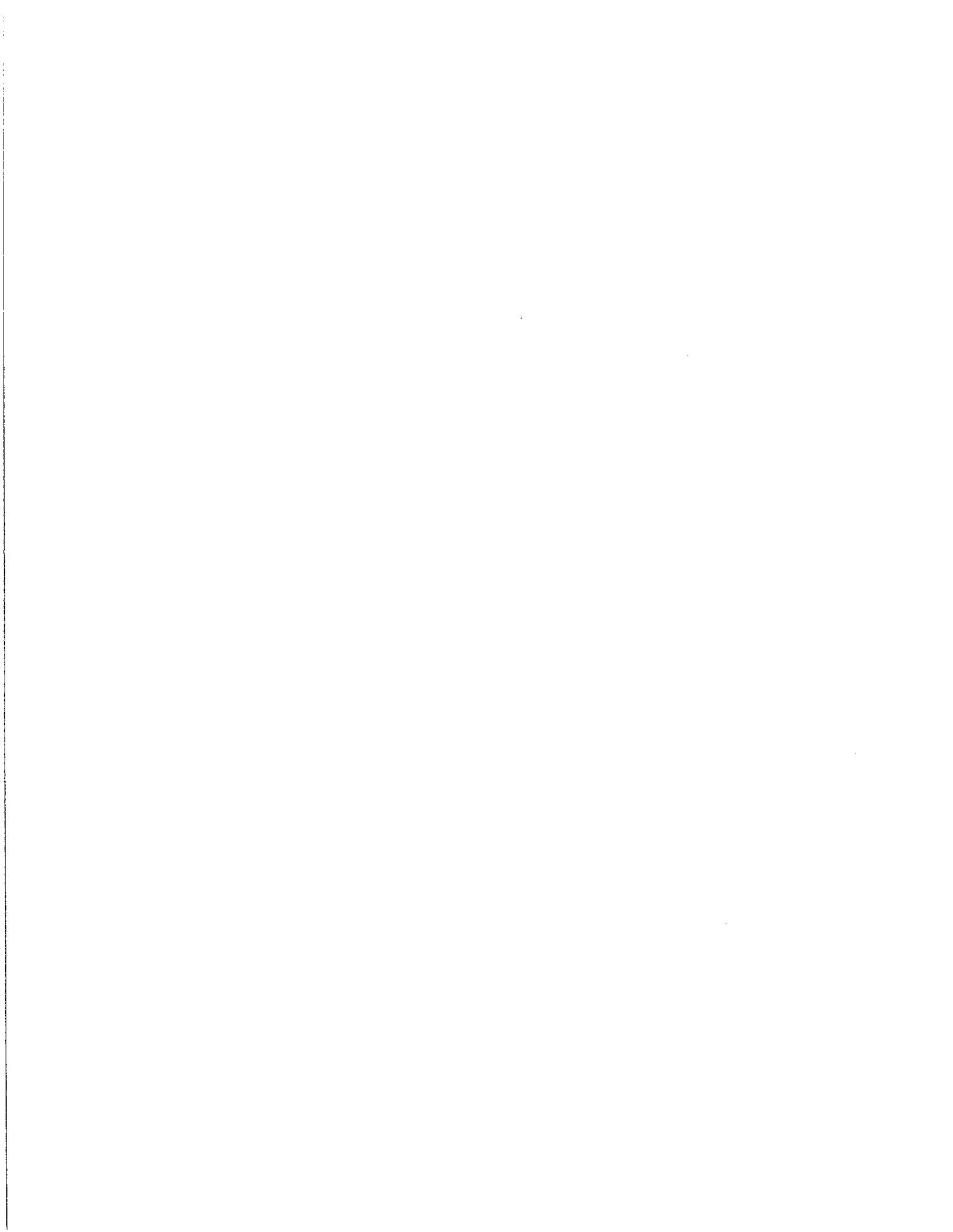
Mechanical Equipment Service: 3 years

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**RESUME FORM (CS 95-1)**

**RESUME: (USE THIS FORM WHENEVER A RESUME IS REQUESTED)**

Complete this form for each Service Technician on your staff

Name: Josh Velozo s.s.# \_\_\_\_\_ (optional)

Title: HVAC Service Tech

Licenses Held: RI & MA Refrigeration Journeyman , Sheetmetal Journeyman RI

Certificates Held: 410a, EPA Universal CFC, braze/ welder, OSHA 10, aerial lift

Diploma Held: \_\_\_\_\_

Courses Taken: \_\_\_\_\_

Years With Your Company: 7 years

Prior Employer: Advanced Air Heat

Years With Prior Employer: 2 months

Years Of Experience In Each Field: \_\_\_\_\_

Chiller Service: 6 years

High Pressure Boiler Services: 5 years

Plumbing: 2 years

Electrical: 7 years

Mechanical Equipment Service: 7 years

\_\_\_\_\_  
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**RESUME FORM (CS 95-1)**

**RESUME: (USE THIS FORM WHENEVER A RESUME IS REQUESTED)**

Complete this form for each Service Technician on your staff

Name: Josh Velozo s.s.# \_\_\_\_\_ (optional)

Title: HVAC Service Tech

Licenses Held: RI & MA Refrigeration Journeyman , Sheetmetal Journeyman RI

Certificates Held: 410a, EPA Universal CFC, braze/ welder, OSHA 10, aerial lift

Diploma Held: \_\_\_\_\_

Courses Taken: \_\_\_\_\_

Years With Your Company: 7 years

Prior Employer: Advanced Air Heat

Years With Prior Employer: 2 months

Years Of Experience In Each Field: \_\_\_\_\_

Chiller Service: 6 years

High Pressure Boiler Services: 5 years

Plumbing: 2 years

Electrical: 7 years

Mechanical Equipment Service: 7 years

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**RESUME FORM (CS 95-1)**

**RESUME: (USE THIS FORM WHENEVER A RESUME IS REQUESTED)**

Complete this form for each Service Technician on your staff

Name: Len Heroux s.s.# \_\_\_\_\_ (optional)

Title: HVAC Technician / Service Manager

Licenses Held: RI Master Refrigeration 1/ Stationary Engineer

Certificates Held: Universal CFC Certificate / Johnson Controls Advanced HVAC Controls

Diploma Held: N/A

Courses Taken: HVAC Design

Years With Your Company: 21 yrs

Prior Employer: Gilbane

Years With Prior Employer: 3 yrs

Years Of Experience In Each Field: \_\_\_\_\_

Chiller Service: 26 yrs

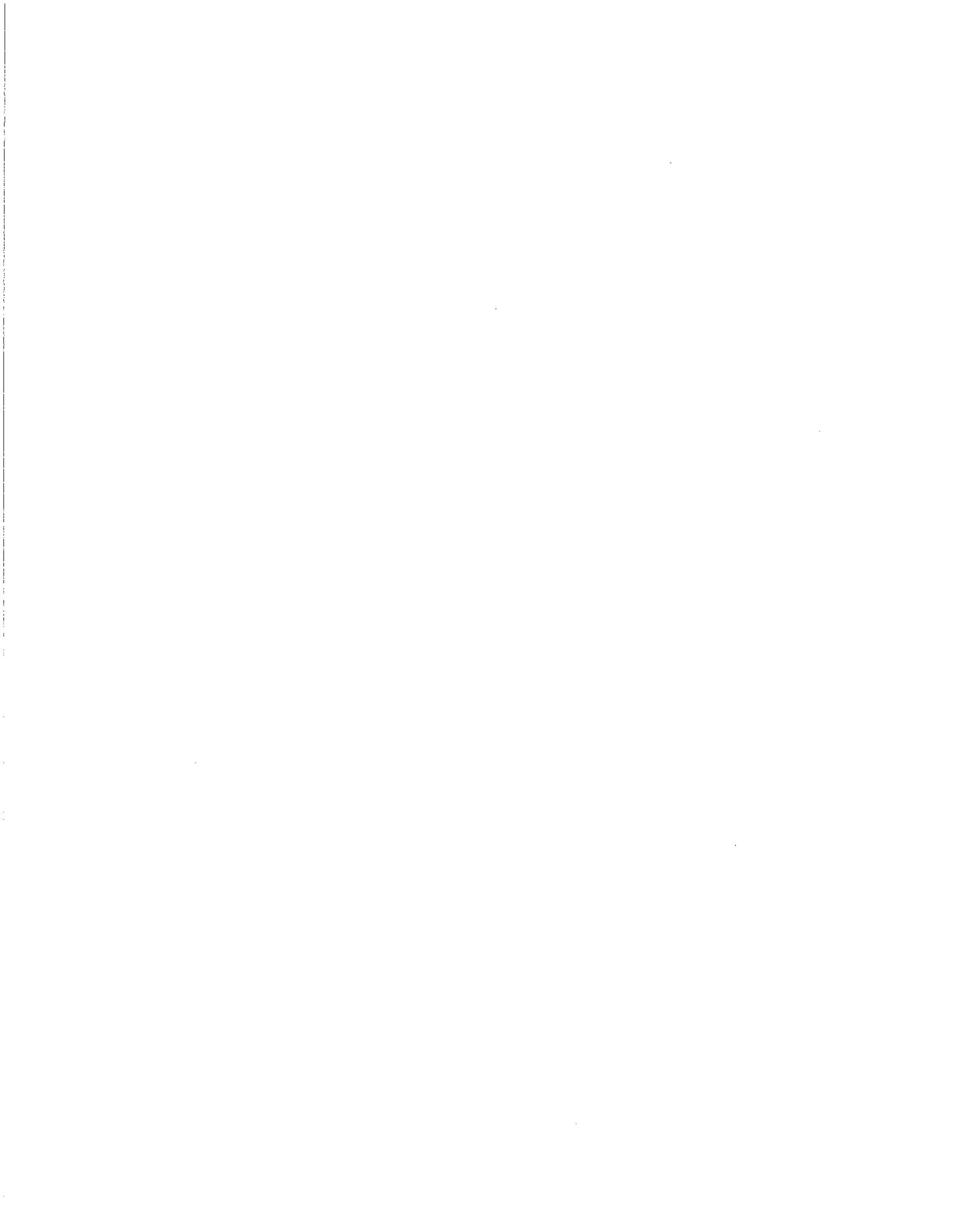
High Pressure Boiler Services: 37 yrs

Plumbing: N/A

Electrical: 27 yrs

Mechanical Equipment Service: 37 yrs

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**RESUME FORM (CS 95-1)**

**RESUME: (USE THIS FORM WHENEVER A RESUME IS REQUESTED)**

Complete this form for each Service Technician on your staff

Name: Nelson Freitas s.s.# \_\_\_\_\_ (optional)

Title: HVAC Service Tech

Licenses Held: Master 1 Refrigeration RI , Sheetmetal Journeyman 1 RI

Certificates Held: OSHA - 10hour

Diploma Held: Associates of Science from NE Institute of Technology

Courses Taken: Manitowic, Hozisaki, Daikin, Mitsubishi, LG, Trane and Carrier

Years With Your Company: 1 year

Prior Employer: Delta Mechanical

Years With Prior Employer: 5 years

Years Of Experience In Each Field: Refrigeration - 14 year, Sheetmetal - 15 years

Chiller Service: 10 years

High Pressure Boiler Services: 5 years

Plumbing: 0

Electrical: 0

Mechanical Equipment Service: 15 years

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**RESUME FORM (CS 95-1)**

**RESUME: (USE THIS FORM WHENEVER A RESUME IS REQUESTED)**

Complete this form for each Service Technician on your staff

Name: Paul Carter s.s.# \_\_\_\_\_ (optional)

Title: HVAC/Service Technician, Controls Engineer/Programmer

Licenses Held: MA Refrigeration, RI Refrigeration Journeyman 1, MA Oil Burners, MA EPA,  
MA Construction Supervisor

Certificates Held: MA EPA

Diploma Held: Associates in Applied Science HVAC

Courses Taken: Johnson Controls

Years With Your Company: 7 yrs

Prior Employer: Delta Keyspan

Years With Prior Employer: 1 yr

Years Of Experience In Each Field: 12 years

Chiller Service: 8 years

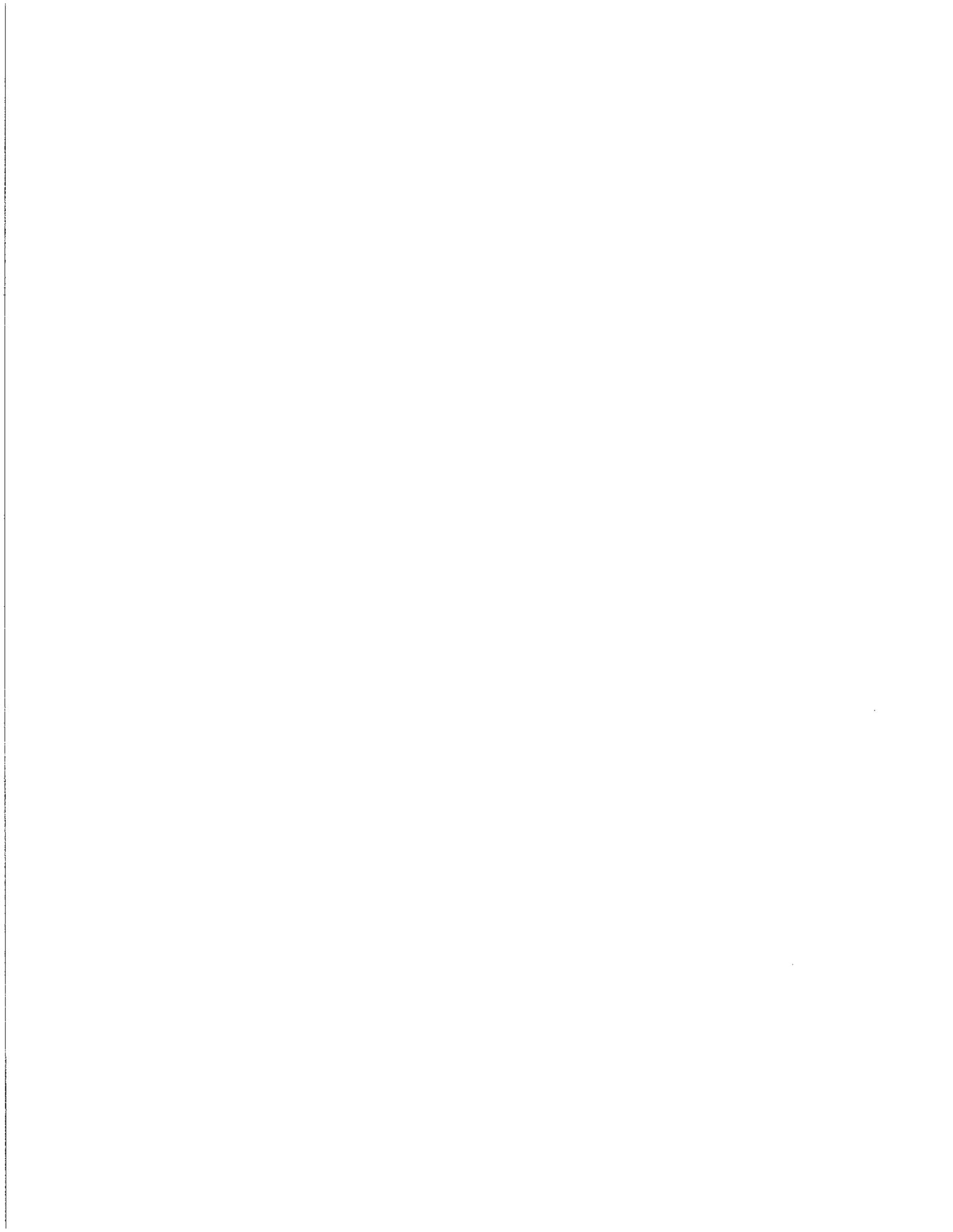
High Pressure Boiler Services: N/A

Plumbing: N/A

Electrical: 14 years

Mechanical Equipment Service: 14 years

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**RESUME FORM (CS 95-1)**

**RESUME: (USE THIS FORM WHENEVER A RESUME IS REQUESTED)**

Complete this form for each Service Technician on your staff

Name: Tyler Steiner s.s.# \_\_\_\_\_ (optional)

Title: HVAC/Controls Technician

Licenses Held: RI Refrigeration Journeyman 1

Certificates Held: Universal Recovery EPA, Crane/Rigging, OSHA-10

Diploma Held: \_\_\_\_\_

Courses Taken: JCI Controls, Trane Controls

Years With Your Company: 6 1/2 years

Prior Employer: William N. Harris HVAC

Years With Prior Employer: 3 year

Years Of Experience In Each Field: \_\_\_\_\_

Chiller Service: 5 years

High Pressure Boiler Services: 2 years

Plumbing: 0

Electrical: 6 years

Mechanical Equipment Service: 6 years

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



State of Rhode Island and Providence Plantations  
Rhode Island Department of Labor and Training.

**REFRIGERATION  
APPRENTICE**  **22618**

**R D CASTELLANOS**  
11 HEMINGWAY DRIVE  
EAST PROVIDENCE RI 02915

**PLUMBERS & PIPEFITTERS # 51**

**JOHN SHAW** **06/30/2016**  
Administrator Expiration Date



Commonwealth of Massachusetts  
Division of Apprentices Training

REG# **E-058-981**  
PLUMBERS & PIPEFITTERS I. JAC  
11 HEMINGWAY DRIVE  
E PROVIDENCE, RI 02915

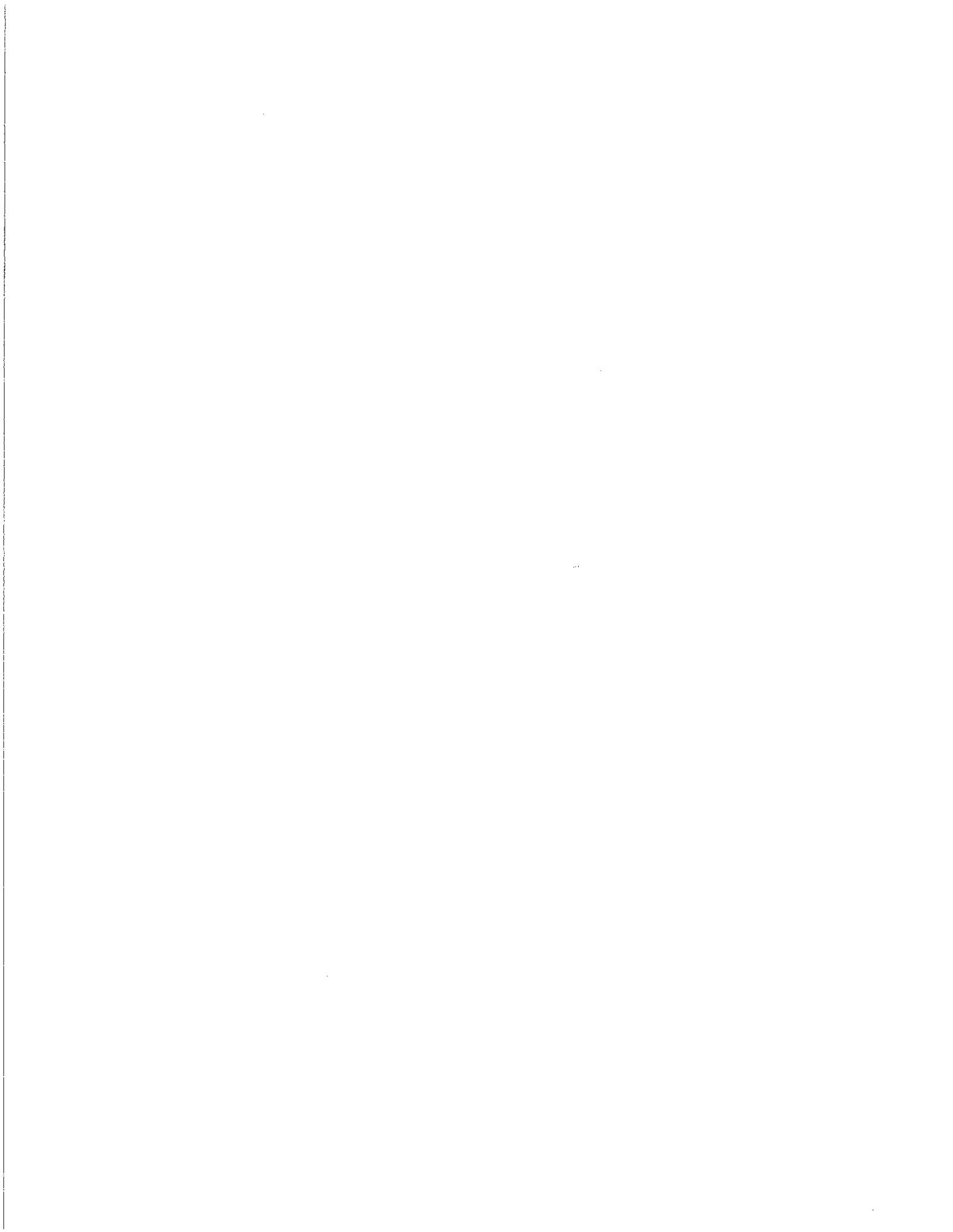
**REFRIGERATION / AIR COND. MECHANIC**

Appr. Start Date Proj. Comp. Date  
**6/29/2015 6/29/2020**

Step 1  Step 2  Step 3  Step 4  Step 5  Step 6  Step 7  Step 8  Step 9  Step 10

**RUBEN  
CASTELLANOS**

Annual Apprentices ID Card Expires **8/4/2016**



Expiration: 01/24/2015

Commissioner



ALFRED J. ARCHETTO JR.  
47 ARCADIA RD.  
EXETER RI 02822  
License: PJ-151196  
Pipefitter Journeyman

Department of Public Safety  
Commonwealth of Massachusetts

Rhode Island Department of Labor and Training  
Division of Workforce Regulation and Safety

REFRIG/JOURNEY 1 RJ1  
PIPEFITTER/JOURNEY 1 PJ1

ALFRED J. ARCHETTO  
47 ARCADIA ROAD  
EXETER RI 02822

*Ronald R. Andrews*  
Administrator

01/31/2014  
Expiration Date

Expiration Date 01/31/2014  
ALFRED J ARCHETTO  
47 ARCADIA ROAD  
EXETER RI 02822  
RFR  
RHODE ISLAND DEPARTMENT OF LABOR AND TRAINING  
DIVISION OF WORKFORCE REGULATION AND SAFETY  
PIPEFITTER/JOURNEYMAN  
RI  
PIPEFITTER/JOURNEYMAN  
RI

Commonwealth of Massachusetts  
Department of Public Safety  
Pipefitter Journeyman  
License: **PJ-151196**  
**ALFRED J ARCHETTO JR**  
47 ARCADIA RD  
EXETER RI 02822  
Thomas D. Bligh  
Commissioner  
Expiration: **01/24/2015**

OSHA 000443581



U.S. Department of Labor  
Occupational Safety and Health Administration

**ALFRED ARCHEVIO JR.**

has successfully completed a 10-hour Occupational Safety and Health  
Training Course in

Construction Safety & Health

*Michael Paul Rojas*  
(Trainer)

7/04  
(Date)

Rhode Island Department of Labor and Training  
Division of Workforce Regulation and Safety

REFRIG/JOURNEY 1 RJ1

JASON J CARREIRO  
3136 ACUSHNET AVENUE  
NEW BEDFORD MA 02745

*Ronald R. Ambrose*  
Administrator

09/30/2014  
Expiration Date



**United Association**  
**Certificate of CFC Qualification**



EPA-608 Technician Certification Program (EPA-Approved § 30.93)

**JASON J. CARREIRO**

ID#: 1554713189 LU#: 51

*Has been certified as required  
by 40 CFR, Part 62, Subpart F*

Type I: 05/02/2005

Type II: 05/02/2005

**OSHA**



U.S. Department of Labor  
Occupational Safety and Health Administration

**Jason Carreiro**

has successfully completed a 10-hour Occupational Safety and Health  
Training Course in

Construction Safety & Health

*A. McPherson* 12-18-01

(Date)



Rhode Island Department of Labor and Training  
Division of Workforce Regulation and Safety

REFRIG/JOURNEY 1  
RJ1

PAUL B CARTER  
135 WALNUT HILL ROAD  
WOONSOCKET RI 02895

*Paul B. Carter*  
Administrator

06/30/2014  
Expiration Date

Commonwealth of Massachusetts  
Department of Public Safety  
Refrigeration Technician

License: RT-109612

PAUL B CARTER  
6 Rolling Brook Lane  
Blackstone MA 01504



*Thomas J. Bligh*  
Commissioner

Expiration:  
06/26/2015

505 Narragansett Park Drive, Pawtucket, Rhode Island 02861. Tel (401) 727-3500 Fax (401) 727-3540 www.ardeneng.com

An Equal Opportunity Employer

Rhode Island  
Master Mechanical #105 & #1409  
Fire Sprinkler Contractor #327  
Master Plumber #1094  
Refrigeration & Pipefitter Journey #RJ1 & #PJ1  
NEBB #2807  
Master Electrician #A-003439 & #B-007513

Massachusetts  
Master Pipefitter #8590  
Master Plumber, Plumbing Contractor #6780  
Sprinkler Contractor #002774  
Refrigeration Contractor #689

Connecticut  
Heating/Cooling Unlimited Contractor #302950 & #302953  
Plumber Unlimited Contractor P-1 #202296

OSHA

000215063

U.S. Department of Labor  
Occupational Safety and Health Administration

Paul Carter

has successfully completed a 10-hour Occupational Safety and Health  
Training Course in

Construction Safety for

Wayne D. Brown *Wayne D. Brown* 8/7/03

(Printer)

(Date)

This card acknowledges that the recipient has successfully completed a 10-hour Occupational Safety and Health Training Course in **Construction Safety and Health**

**WILLIAM FITZGERALD**

Marie Athey

4/7/2013

(Trainer name - print or type)

(Course end date)



Commonwealth of Massachusetts  
Department of Public Safety

Refrigeration Technician

License: **RT-149247**

**WILLIAM FITZGERALD**  
307 WHETSTONE MILLS  
DAYVILLE CT 06241



*Thomas D. Bligh*  
Commissioner

Expiration:  
**07/20/2015**

Rhode Island Department of Labor and Training  
Division of Workforce Regulation and Safety

**REFRIG/JOURNEY 1 R11**  
**PIPEFITTER/JOURNEY 1 P11**

**WILLIAM J FITZGERALD**  
307 WHETSTONE MILLS  
DAYVILLE CT 06241

*Randall R. Mahoney*  
Administrator

**07/31/2015**  
Expiration Date

**DL** *Commonwealth of Massachusetts*  
CLASS D DRIVER LICENSE

1 Class: **D** 12 Rest: **B** 13 Endors: **NONE**

4 Lic #: **078311007** 15 Sex: **M**

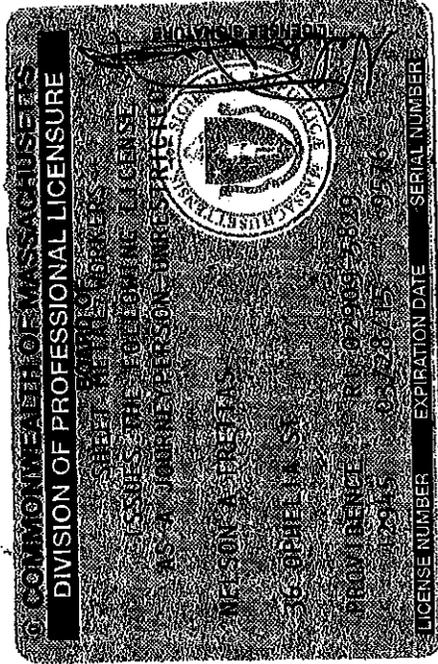
5 DOB: **07-20-1981** 16 Ht: **72**

6 Expires: **07-20-2019** 18 Eyes: **BL**

1 **FITZGERALD**  
2 **WILLIAM JOSEPH**  
3 **307 WHETSTONE MILLS**  
4 **DAYVILLE CT 06241-1838**

4 issued: **06-15-2013**

*Btz*





Commonwealth of Massachusetts  
Department of Public Safety  
Refrigeration Technician

License: RT-114244

NELSON FREITAS  
36 OPHELIA ST  
PROVIDENCE RI 02904



*Thomas W. Kelly*  
Commissioner

Expiration:  
03/27/2014

**Refrigerant Transition And Recovery Program**

Program approval by U.S. EPA: 11/21/00

**Nelson A. Freitas**

**Type II**

technician as required by 40 CFR Part 82, Subpart F

**Certification Number**

038501920

**Date Certified**

11/02/01

**Pennsylvania College  
of Technology**

PENNSYLVANIA



OSHA 001200203



U.S. Department of Labor  
Occupational Safety and Health Administration

**Nelson Freitas**

has successfully completed a 10-hour Occupational Safety and Health  
Training Course in

Construction Safety & Health

*Nelson Freitas*  
(Trainer)

9/30/06  
(Date)



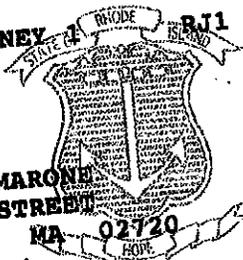
The Commonwealth of Massachusetts  
 DEPARTMENT OF PUBLIC SAFETY  
 Oil Burner Technician Certificate

Number: BU 120774  
 Expires: 07/07/2013 Tr. no: 1210.0  
 Restricted: 00

AARON J. IAMARONE  
 465 ELSBREE ST  
 FALL RIVER, MA 02720

*Thomas D. Bligh*  
 Commissioner

Rhode Island Department of Labor and Training  
 Division of Workforce Regulation and Safety  
**REFRIG/JOURNEY RI1**



AARON J. IAMARONE  
 226 ADAMS STREET  
 FALL RIVER MA 02720

*Ronald R. Ambrose*  
 Administrator

07/31/2014  
 Expiration Date



Commonwealth of Massachusetts  
 Department of Public Safety  
 Refrigeration Technician  
 License: RT-147964

AARON J. IAMARONE  
 230 OSBOURNE ST.  
 Fall River MA 02724

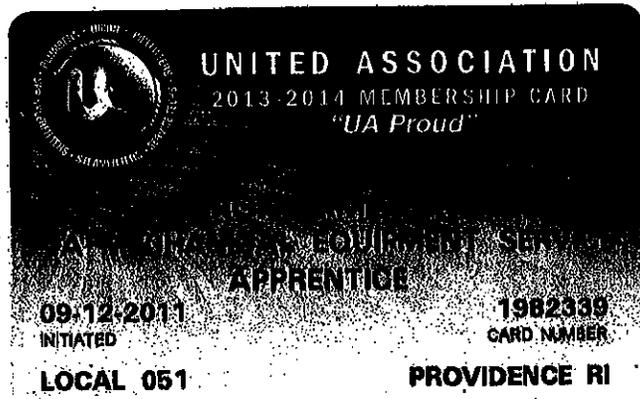


*Thomas D. Bligh*  
 Commissioner

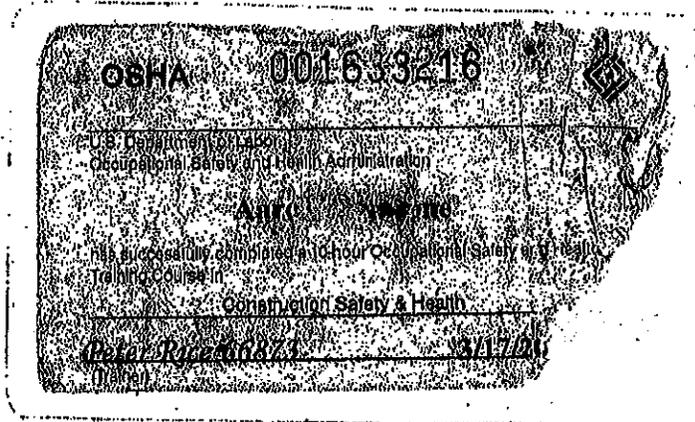
Expiration:  
 07/07/2014

Aaron Iamarone  
 ID #: 12373664

STAR Mastery Certification  
 STAR HVACR Mastery  
 Valid Until 1/19/2018



Aaron Iamarone





Commonwealth of Massachusetts  
Division of Apprenticeship Training

REG# E-054-138

PLUMBERS & PIPEFITTERS L.V. ST. JAC

11 HEMINGWAY DRIVE

E PROVIDENCE, RI

Reciprocal



**REFRIGERATION / AIR COND. MECHANIC**

Appr. Start Date

Proj. Comp. Date

7/16/2013

7/16/2018

Step 1	<input checked="" type="checkbox"/>	Step 3	<input type="checkbox"/>	Step 5	<input type="checkbox"/>	Step 7	<input type="checkbox"/>	Step 9	<input type="checkbox"/>
Step 2	<input type="checkbox"/>	Step 4	<input type="checkbox"/>	Step 6	<input type="checkbox"/>	Step 8	<input type="checkbox"/>	Step 10	<input type="checkbox"/>

DANIEL MARLA

**Annual Apprentice I.D.**

**Card Expires 10/18/2014**



11-004322967

This card acknowledges that the recipient has successfully completed a  
10-hour Occupational Safety and Health Training Course in  
**Construction Safety and Health**

**Daniel Marland**

**Michael Raposa**

(Trainer name - print or type)

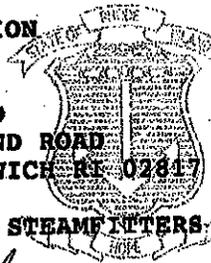
**7/17/13**  
(Course end date)

Rhode Island Department of Labor and Training  
Division of Workforce Regulation and Safety

**REFRIGERATION  
APPRENTICE**

**21690**

**D MARLAND  
345 FRY POND ROAD  
WEST GREENWICH RI 02817**



**PLUMBERS & STEAMFITTERS LU#51**

*Ronald R. Ambrose*  
Administrator

**07/31/2014**  
Expiration Date



Commonwealth of Massachusetts  
Division of Apprenticeship Training

REG# E-051-966

PLUMBERS & PIPEFITTERS I. U. O. M. J. A. C.  
11 HEMINGWAY DRIVE  
E PROVIDENCE, RI 02903

Reciprocal



**REFRIGERATION / AIR COND. MECHANIC**

Appr. Start Date

Proj. Comp. Date

7/30/2012

7/30/2017

JOSEPH PIMENTEL

Step 1	<input checked="" type="checkbox"/>	Step 3	<input checked="" type="checkbox"/>	Step 5	<input type="checkbox"/>	Step 7	<input type="checkbox"/>	Step 9	<input type="checkbox"/>
Step 2	<input checked="" type="checkbox"/>	Step 4	<input type="checkbox"/>	Step 6	<input type="checkbox"/>	Step 8	<input type="checkbox"/>	Step 10	<input type="checkbox"/>

**Annual Apprentice I.D.**

Card Expires

2/14/2014



11-004052183

This card acknowledges that the recipient has successfully completed a  
10-hour Occupational Safety and Health Training Course in  
**Construction Safety and Health**

**Joseph Pimentel**

---

**Michael Raposa**

**7/14/12**

(Trainer name - print or type)

(Course end date)

Rhode Island Department of Labor and Training  
Division of Workforce Regulation and Safety

PIPEFITTER/REFRIG  
APPRENTICE 21193

A SMITH  
11 HEMINGWAY DRIVE  
EAST PROVIDENCE RI 02915

PLUMBERS & STEAMFITTERS LU#51

*Ronald P. O'Rourke*  
Administrator  
12/31/2013  
Expiration Date

Commonwealth of Massachusetts  
Division of Apprentice Training  
REG# E-050-277  
PLUMBERS & PIPEFITTERS I.P.O.S.I.  
JAC  
11 HEMINGWAY DRIVE  
E PROVIDENCE, RI 02915



AARON SMITH

Refrigeration / Air Cond. Mechanic  
Appr. Start Date 12/15/2011 Proj. Comp. Date 12/15/2016  
Sept  Sept  Sept  Sept   
Oct  Oct  Oct  Oct   
Nov  Nov  Nov  Nov   
Dec  Dec  Dec  Dec

Annual Apprentices I.D. Card Expires 6/4/2013

PHOTO AND RECORDS  
WITH THIS LICENSE

Not valid without signature.

If found, please return to:  
DLT, 1511 Pontiac Avenue, Cranston, RI 02920-0943  
Ph: (401) 462-8580 www.dlt.ri.gov/profregs

**OSHA** Occupational  
Safety and Health  
Administration

11-003398334

This card acknowledges that the recipient has successfully completed a  
10-hour Occupational Safety and Health Training Course in  
**Construction Safety and Health**

**Aaron Smith**

---

**Michael Raposa** 7/18/11

(Trainer name - print or type)

(Course end date)

Rhode Island Department of Labor and Training  
Division of Workforce Regulation and Safety

REFRIG/JOURNEY I RJI

TYLER J SPINER  
28 WOODSON  
SCITUATE RI 02857

*Ronald R. McNamee*  
Administrator

~~01/31/2015~~  
Expiration Date

**OSHA** 001561592

U.S. Department of Labor  
Occupational Safety and Health Administration

**Tyler Steiner**  
has successfully completed a 40-hour Occupational Safety and Health  
Training Course in  
Construction Safety & Health

*Richard Val Regan*  
Instructor

**Certificate of Completion**  
**Aerial Work Platforms**  
**TYLER STEINER**  
Has completed training in the safety and  
operations of scissors and booms and has  
demonstrated an understanding of the proper  
usage and safety procedures  
Date: 01/22/08 Expires: 01/22/11  
Instructor *[Signature]*

**United Association**  
EPA Section 608  
Technician Certification  
[EPA Approved 9-30-93]

**TYLER STEINER**  
ID#: 1499334389 LU#: 51  
Has been certified as required  
by 40 CFR, Part 82, Subpart F  
Type I: 04/15/2009  
Type II: 04/15/2009  
Type III: 06/09/2009  
Universal: 06/09/2009

Commonwealth of Massachusetts  
Division of Apprentices Training

**TYLER STEINER**  
PIPEFITTER / 9270  
PLUMBERS & PIPEFITTERS L.U. NO. 51 JAC (RI)  
11 HEMINGWAY DRIVE  
E. PROVIDENCE, RI 02915  
REG# B.012.681

Credits: None  
Appr. Start Date: 12/17/07 Proj. Com. Date: 12/17/12 Card Expires: 12/17/13

Reciprocal



Rhode Island Department of Labor and Training  
Division of Workforce Regulation and Safety

**PIPEFITTER/REFRIG  
APPRENTICE 19568**

**T STEINER**  
11 HEMINGWAY DRIVE  
EAST PROVIDENCE RI 02915

**PLUMBERS & STEAMFITTERS LU#51**

*Ronald R. Andrews*  
Administrator

12/31/2011  
Expiration Date

**United Association**  
**CRANE Certification**  
**TYLER STEINER**  
UA #: 001643233 LU# 51

Issue Date: 04/02/2011  
Expiration Date: 04/02/2016  
CRANE Signalperson



PIPEFITTER/REFRIG  
APPRENTICE 19665

J ZINA  
11 HEMINGWAY DRIVE  
EAST PROVIDENCE RI 02915

PLUMBERS & STEAMFITTERS LU#51

*Ronald R. Ambrose*  
Administrator

03/31/2014  
Expiration Date



**United Association**

EPA Section 608  
Technician Certification  
[EPA-Approved 9-30-93]



**JASON ZINA**

ID#: 1901792768 LU#: 51

*Has been certified as required  
by 40 CFR, Part 82, Subpart F*

Type I: 04/15/2009  
Type II: 04/15/2009  
Type III: 04/15/2009  
Universal: 04/15/2009

OSHA 001185787

U.S. Department of Labor  
Occupational Safety and Health Administration

**JASON ZINA**

has successfully completed a 10-hour Occupational Safety and Health  
Training Course in

Construction Safety & Health

**JACK COLLINS**

(Trainer)

9/06  
(Date)

## Project Relevant Experience - Valued at \$10,000 - \$30,000

**Customer** Carnegie Abbey Condos  
**Date Started** 7/1/2014  
**Date Completed** 8/30/2014  
**Description of Work** Replace (2) PVI domestic water heaters with (2) new units in penthouse  
**Contact Person** Paul Shannon - First Realty Management  
**Phone and Email** (401) 293-5995; pshannon@firstrealtymgt.com  
**Project Value** \$38,000

**Customer** Memorial Hospital of RI - Care NE  
**Date Started** 8/22/2015  
**Date Completed** 9/24/2015  
**Description of Work** Cooling Tower PM. Replacement of fan and motor  
**Contact Person** Brian Willis  
**Phone and Email** 401-72-2474; bwillis@carene.org  
**Project Value** \$15,000

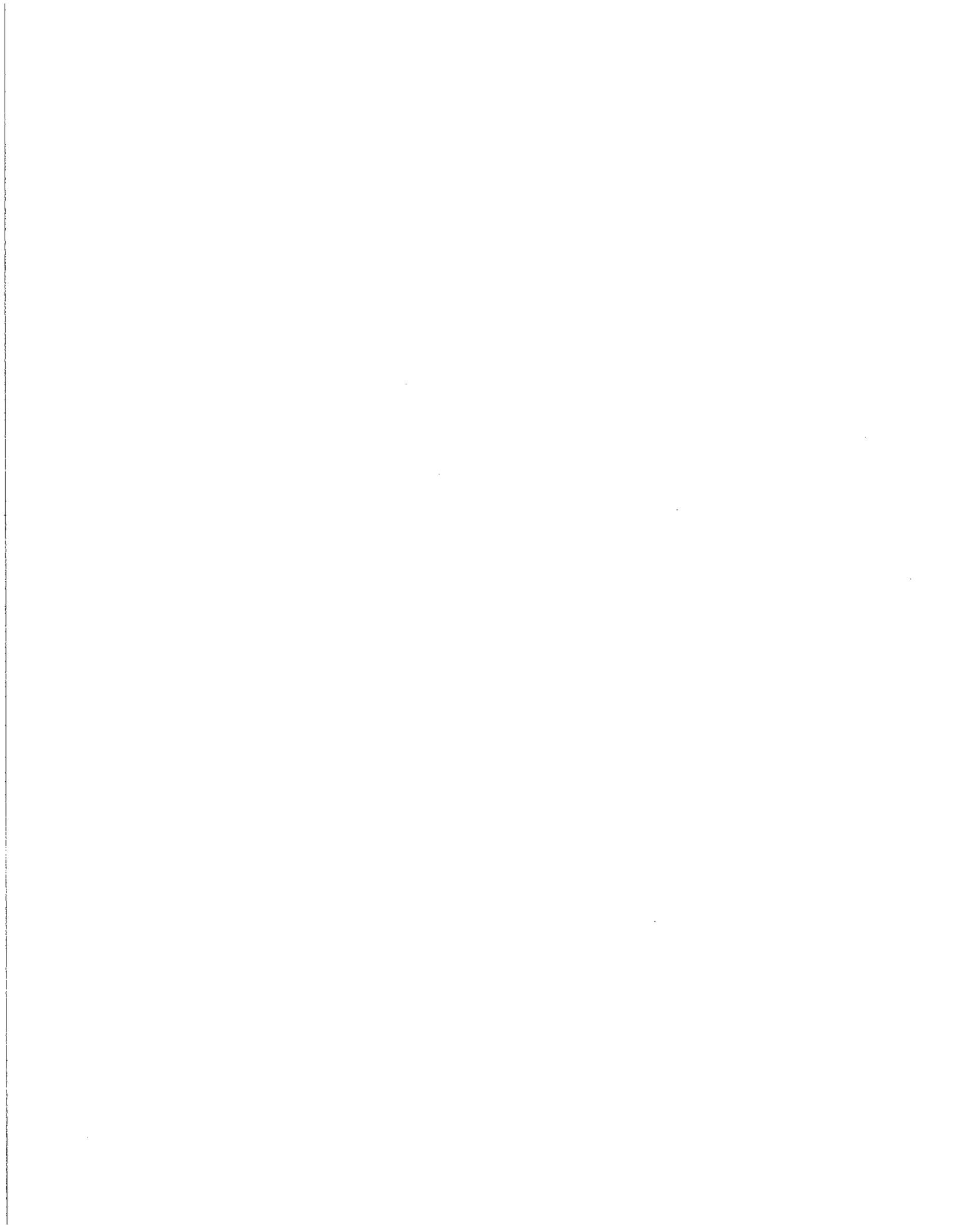
**Customer** Pawtucket Water Supply Board  
**Date Started** 10/1/2015  
**Date Completed** 10/30/2015  
**Description of Work** Replace oil fired furnace with new gas fired unit, update controls  
**Contact Person** Chris Collins  
**Phone and Email** 401-729-5020; ccollins@pwsb.org  
**Project Value** \$22,000



### Previous Experience and References

Arden Engineering Constructors, LLC currently works with building owners to provide construction management, design build services, renovation, pre-purchase mechanical due diligence audits, engineering services, IAQ, building operations services, equipment repairs and energy management services. Notable references are:

<u>Client</u>	<u>Location</u>	<u>Type of Space</u>	<u>Scope</u>
Amica Mutual Insurance Co. P.O. Box 6008 Providence, RI 02940 1-800-653-6422 Paul Durnin, Senior Corporate Services Assistant	4 buildings, HVAC services including boilers, RTU's & AHU's	Offices	T&M
Blue Cross/Blue Shield of RI One Empire Plaza Providence, RI 02903 401-459-1602 William Martin, Manager Building Services	5 buildings, HVAC services including chillers, RTU's, air & water testing & balancing	Offices	PM T&M
Reebok International, Ltd. 1895 J.W. Foster Blvd. Canton, MA 02021 781-401-7022 Brendon Walsh, Facility Manager	Canton Facility HVAC services including chillers, boilers, AHU's cooling towers, FCU's & pumps	Offices	Full Service
RI Hospital 593 Eddy Street Providence, RI 02905 401-444-8043 Mehrdad Khosravani P.E. Chief Facility Engineer	Various Buildings, HVAC service as well as extensive air & water testing and balancing	Hospital	T&M
State of Rhode Island 2 Capitol Hill Providence, RI 02903 401-222-6232 Mr. Joseph Palombo Building & Service Coord.	30+ buildings HVAC services include boilers, chillers, towers packaged equipment & refrigeration equipment Air and Water balancing	Offices	PM T&M

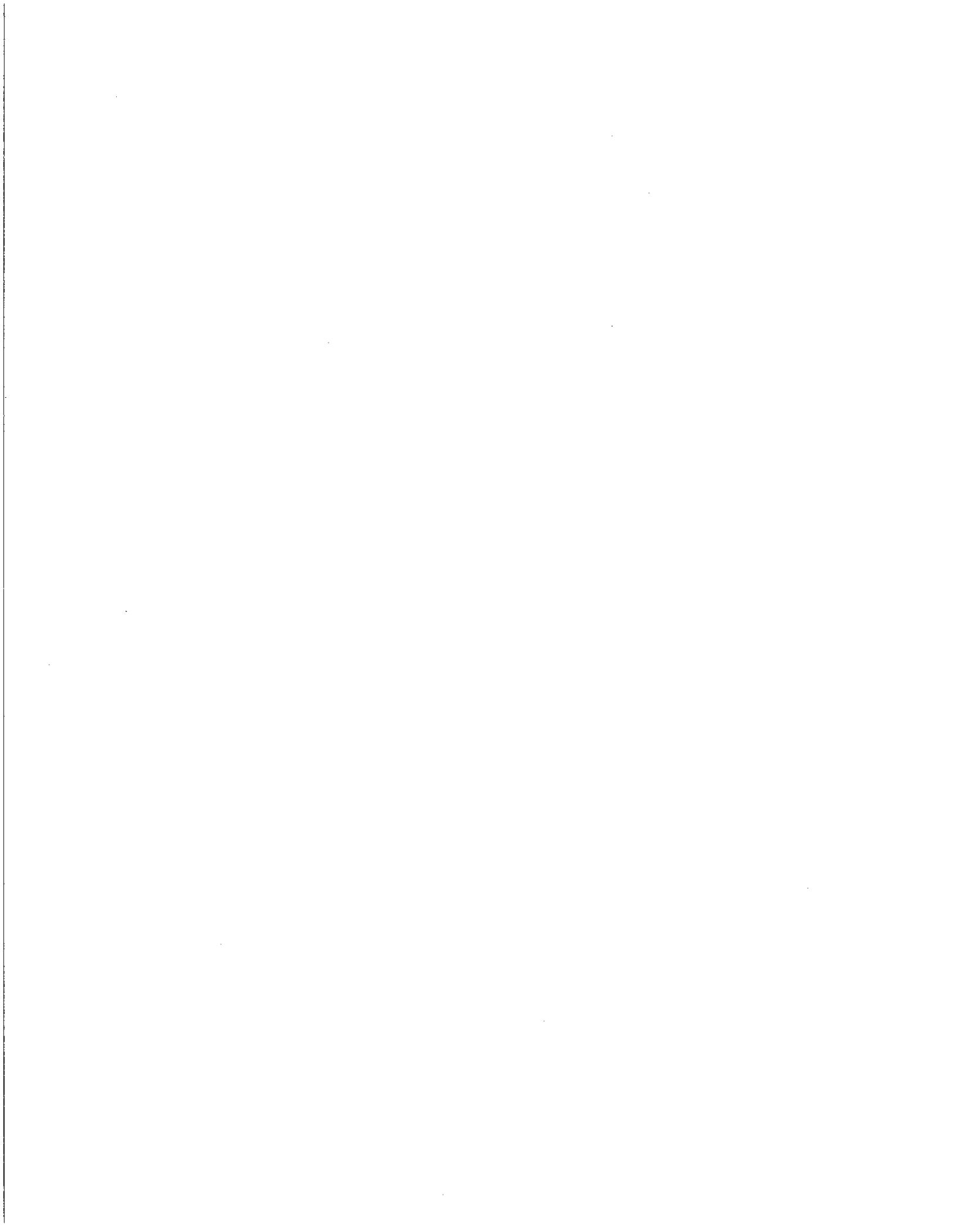


## **Minority Business Enterprise Requirement**

Arden Engineering is not a WBE or MBE certified company. We will purchase supplies from a WBE or MBE company whenever possible to fulfill the 10% MBE requirement. Examples of the supplies that are purchased for work on the MPA include the following:

- Electric Motors and parts
- Pumps and pump seals
- Belts & Sheaves
- Fans & Blowers
- Filters
- Heat Exchangers

Arden's goal is to meet the 10% state MBE/WBE requirement whenever feasible but cannot guarantee this will be met for all projects and quotes.



## Over 50 years of experience

For over fifty years, we've been here to insure your building's mechanical systems are designed, installed and serviced to meet the highest standards of performance and efficiency and save you operating costs for the life of your building.

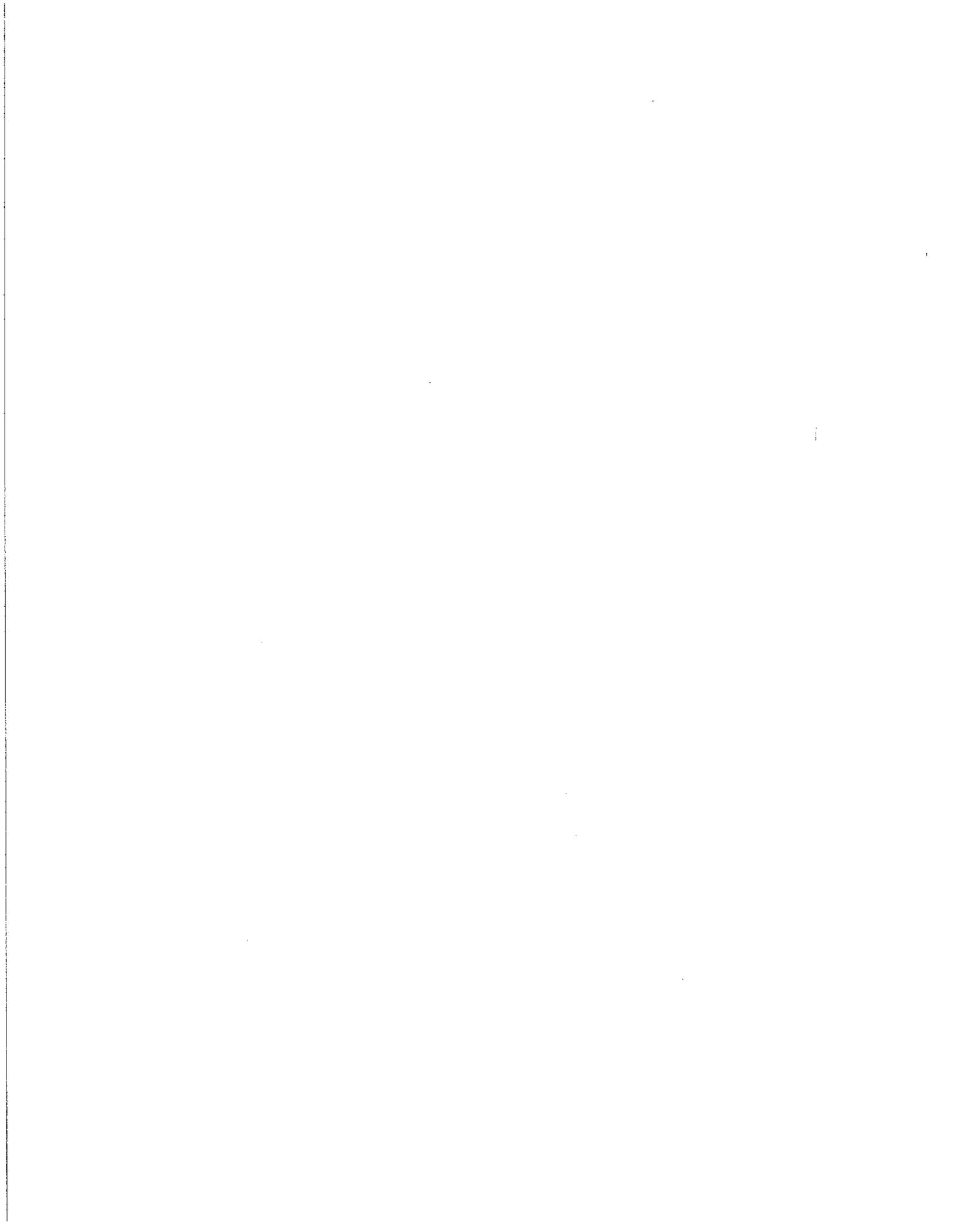
Arden Engineering Constructors, LLC is owned by **The Arden Building Companies** and is Rhode Island's largest and premier mechanical and HVAC service contractor.

We deliver quality design-build solutions in mechanical construction and service, sprinkler installation and service and specialized fabricated systems made by our fabrication facility. We are also experts in water and air balancing, electrical and fire alarm construction and service.

Find out how Arden Engineering can help you. Our services include:

- Professional Engineering design services
- Mechanical design, construction and service
- Sprinkler installation and service
- Plumbing installation and service
- Air and water balancing ( NEBB Certified )
- Fire alarm installation and service
- Electrical construction
- Material and pipe fabrication

We are trained, certified, experienced and ready to meet the goals and needs of your building. We can design and install new mechanical systems, retrofit or repair your existing systems, and provide comprehensive preventative maintenance programs to preserve and maximize the life expectancy (and cost) of your equipment, your building; your investment.



## **Section 16: Additional Requirements**

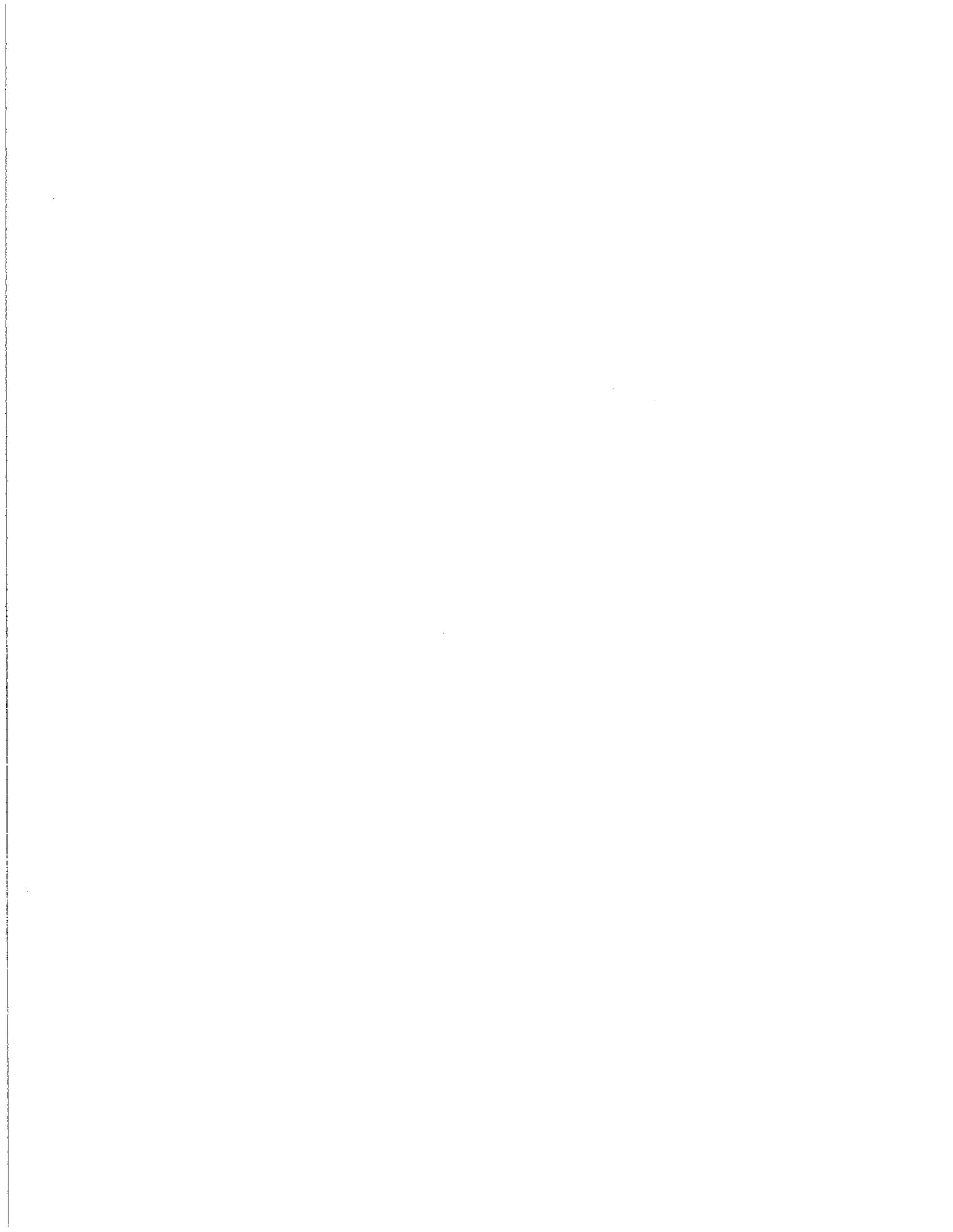
16.1: Arden provides full 24/7 coverage to all customers through our phone service. All calls for service (planned or emergency) should be called in to us at 1-866-GO-ARDEN (462-7336). This number will be answered by one of our dispatchers between the hours of 7am and 5pm. After 5pm, the calls will go directly to our answering service who will then call the appropriate person to address the service call.

16.2: John Conroy is the Safety Manager for all Arden Building Companies.

- i. A copy of our safety program is attached for reference.
- ii. All Arden Engineering field and office employees are 10 hour OSHA trained. We have several employees that are Confined Space Trained, please see the attached list.

16.3: Arden owns all equipment necessary for planned maintenance on HVAC equipment. In addition to this we own a full fleet of welding machines for all forms of welding and have a full fabrication shop for any piping work.

16.4: Arden will be self-performing all work required under this MPA. Arden is a full service mechanical contractor and we employ union employees for all these trades in house.





# Health & Safety Manual

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## **History of changes, updates, additions, and/or deletions to this manual.**

1. 4/15/2011:
  - a. Added "Benzene" section to Section 6.
  - b. Updated driving safety items in "Motor Vehicles & Mechanized Equipment" in Section 6.
  - c. Updated "Emergency Response / Evacuation Plan" in Section 5.
  - d. Updated hazard identification items in "Job Hazard Analysis (JHA)" in Section 5.
  - e. Updated Section 3 – "Serious Incident Investigation Procedures".
  - f. Updated manual lifting items in "Ergonomics" and "Materials Handling & Storing" in Section 6.
2. 8/17/2012:
  - a. Updated "Fire Prevention" section to Section 6.
  - b. Updated "Crane" section.
  - c. Updated



## LETTER OF POLICY AND AUTHORIZATION

July 19, 2010

Arden Engineering Constructors, LLC has established this Health and Safety manual to help achieve a safe, accident-free work place. This manual is to be used at Arden jobsites and fabrication facilities.

Executive management does and will continue to support this manual and its implementation to the fullest.

The Director of Safety & Back Shop Operations and Safety Committee are given the full responsibility and freedom of action to identify unsafe conditions and to initiate and recommend solutions.

The Director of Safety & Back Shop Operations and Safety Committee have the complete support and backing of company management in this undertaking. If any disagreement arises, it will be resolved by me and in no way shall my decision violate health or health requirements.

Arden Engineering Constructors, LLC

Original Signed

Robert M. Bolton, President

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## Section 1. Employee Responsibilities.

### A. All Employees.

1. Be familiar and comply with health and safety practices as posted, instructed, trained, discussed, and listed in this manual.
2. Receive appropriate training for each task performed.
3. Immediately cease work and report unsafe or non-compliant equipment, acts, or practices to their supervisor.
4. Follow all lawful and safe directives of supervisors.
5. Properly use and maintain safety devices and personal protective safety equipment.
6. Immediately report to their supervisor all injuries, accidents, and near-misses.

### B. Competent Persons.

1. "Competent person" means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.
2. Employees assigned as competent persons shall pay close attention to the areas they have been designated competent in.
3. They shall identify existing and predictable hazards within their areas of assignment, report them to their supervisor, and take immediate corrective measures to eliminate them.

### C. Foremen.

1. Be responsible for their workers' safe behavior and work habits.
2. Immediately address all unsafe acts, behavior, and attitudes.
3. Confirm workers properly use safety devices and personal protective equipment.
4. Ensure workers participate in documented weekly safety toolbox meetings.
5. Participate in injury, loss, or near miss incident investigations.
6. Monitor work areas daily for potential hazards and take necessary corrective actions.
7. Report to the Project Manager/Superintendent any actions needed beyond their control.
8. Provide positive reinforcement to workers on safety performance where appropriate.
9. Continually screen all employees under their supervision for craft knowledge, safety knowledge, physical limitations and current job knowledge. Correct any noted deficiencies promptly.
10. Inspect at least once a week the hand tools used by their crew.
11. Ensure equipment such as scissor lifts are inspected prior to each shift use.
12. Look ahead at the schedule to ensure adequate preparations are made for safe work.
13. Coordinate work activities of other foremen in their area to ensure a safe work environment is maintained for all workers.
14. Develop and brief to all involved workers Job Hazard Assessments (JHAs) when necessary.

### D. General Foremen / Area Foremen.

1. Be responsible for the actions of Foremen under their direction.
2. Determine if craftsmen are receiving adequate instruction covering their work operations and that instructions are understood.
3. Discuss potential hazards of any operation with the appropriate Construction Superintendent; then assure that the Foreman and craftsmen understand the precautions to be taken under such conditions.
4. Monitor safety attitudes of Foremen and their subordinates.
5. Insist on compliance with all established safety regulations before and during work.
6. Make safety inspections and corrections on a daily basis.
7. Monitor their Foremen's weekly Safety Toolbox Meetings.
8. Make plans to have the tools, materials and equipment necessary to do the job safely.
9. Assist with incident investigations.
10. Immediately correct hazards discovered or brought to their attention.
11. Review or assist with development of Job Hazard Analysis.

### E. Project Managers.

1. Ensure subcontractors comply with required safety rules and regulations. When selecting subcontractors their safety performance shall be reviewed prior to awarding work. Selection of subcontractors lacking adequate safety performance must be approved by the Vice-President. The Director of Safety will be notified of such selection and a comprehensive safety plan will be developed to manage the subcontractor's performance while on the job.
  2. Projects will be reviewed to ensure health and safety issues are preplanned for all scopes of work. Preplanning will be used to develop a Job Hazard Analysis and a site-specific safety plan when a project has an extensive scope of work or a high-risk work task involved.
  3. Conduct and record jobsite inspections at least monthly.
  4. Review and act on reports of safety issues.
  5. Review all incident reports with jobsite supervisors and ensure corrective action is taken.
  6. Review Owner, Construction Manager, and General Contractor additional safety requirements and ensures they are communicated to all employees working on the project to include those of subcontractors.
  7. Review and assist with development of Job Hazard Analysis.
- F. Director of Safety.
1. Oversee environmental, safety, and health operations within the Company.
  2. Report to management concerning the effectiveness of health and safety program and make recommendations for improvement when necessary.
  3. Provide environmental, safety and health technical resources.
  4. Conduct jobsite inspections to ensure compliance with this program.
  5. Identify unsafe conditions and initiate, recommend and provide solutions.
  6. Review and assist with development of Job Hazard Analysis.
  7. Ensure injuries are recorded and reported in accordance with OSHA regulation 29 CFR Part 1904.
- G. Executive Management.
1. Dedicate resources to this program.
  2. Demonstrate observable leadership that supports the goals of this program.
  3. Conduct periodic reviews of environmental, safety, and health performance with Project Managers, General Foremen/Area Foremen, Foremen, and the Director of Safety.
- H. Safety Committee.
1. There should be a representative from each area and trade of the Company on the committee. Representatives will be volunteers, recommended by the safety committee, with final approval by management. Members will serve a continuous term of at least one year. Length of membership should be staggered to ensure experienced members are always serving on the committee.
  2. The safety committee advises management on issues that will promote health and safety in the workplace. Written recommendations, from the committee, will be submitted to management. In turn, management will give serious consideration to the recommendations submitted, and will respond to the committee within a reasonable time period. Management will have final authority for implementing recommendations.
  3. Objectives and Duties:
    - a. Submit recommendations for environment, health, and safety improvement and changes.
    - b. Evaluate employer's environment, health, and safety policies and procedures.
    - c. Hold regular meetings.
    - d. Distribute minutes of the meeting to management.
    - e. Establish procedures for workplace inspections to identify hazards.
    - f. Development and manage a safety awards program.
    - g. Investigate all safety incidents and recommend corrective actions.
    - h. Recommend and approve training material.

## Section 2. Discipline Policy and Procedures.

### A. Overview.

1. Safety discipline is the proper performance of an employee's day-to-day activities resulting in acceptable safe conduct. Employees are not punished for having an accident, but may be disciplined for failing to perform safe work or committing unsafe acts.
2. Project managers, superintendents, foremen, and safety personnel are responsible for enforcing the discipline policy and discipline procedures.
3. Physical inspections of work areas must be conducted to ensure compliance with safety rules and policies. See *Jobsite Inspection Checklist* for a complete list of areas that should be inspected on a routine basis. Employees responsible for creating a "No" result on the checklist will be addressed under this section.

### B. Violations.

1. Employees who violate safety rules, or who otherwise do not perform their jobs in a safe manner, will be subject to appropriate disciplinary action; up to and including termination. Documented written and verbal warnings for safety violations will become part of the employee's permanent file. Receipt of three (3) such warning reports for safety violations within a 12 month period will result in termination of employment. Egregious violation of established safety procedures may result in immediate termination without any further warning. The following list of "intolerable offenses" shall be enforced on all projects. The list is not intended to be all-inclusive and may be revised as dictated by the needs of the project. These violations will be considered acts of gross misconduct and may result in immediate termination of the offending employee(s). Any employee terminated for any of the following violations will not be eligible for rehire for the length of the project.
  - a. Violation of procedures for Fall Protection, Line Breaking, Lockout/Tagout, etc.
  - b. Failure to follow lawful or safety directives of a Foreman or other management.
  - c. Violation of alcohol/substance abuse policy.
  - d. Fighting or horseplay on the job.
  - e. Possession of firearms/weapons on the job.
  - f. Insubordination.
  - g. Willful or negligent destruction, damaging, mutilating, or removing without permission any property belonging to the owner, employer, other contractors, or other employees.
  - h. Acts of sabotage, bomb threat, defacing buildings, facilities, and/or equipment.
  - i. Creating a disturbance, practical joking, or horseplay.
  - j. Failure to allow lunch box or parcel examination upon entering or leaving a project or jobsite.
  - k. Eating, drinking, and/or smoking in other than designated areas.
  - l. Unauthorized picture taking.
  - m. Misuse of tools, equipment, or facilities.
  - n. Use of personal portable radios, stereos, etc., in prohibited areas during working hours.

### C. Levels of discipline.

1. The level of discipline to be applied is dependent on the severity of the incident. A severe violation is one that puts the violating employee and/or other employees in danger. If management deems the safety violation severe, termination will be immediate. For non-severe violations the following progressive steps will take place:
  - a. **First Violation** – Verbal counseling and re-training (if appropriate). The verbal counseling will be recorded, filed in the employee's permanent file, and a copy forwarded to the Director of Safety & Back Shop Operations. The counseling should include what the employee did wrong, why it was wrong, and how to do it correctly.
  - b. **Repeat Violation** – Written warning and re-training (if appropriate). The warning will be documented in written form, filed in the employee's permanent file, and a copy forwarded to the Director of Safety & Back Shop Operations. The written warning will include specifics of the safety violation observed and when it must be corrected by.

- c. **Second Repeat Violation** - Suspension without pay or termination depending on the employee's apparent lack of regard for safety.

D. **Expected conduct.**

- a. All employees are expected to correct any unsafe conditions within their authority and ability. If they cannot correct it they are expected to report the unsafe condition to their supervisor. Good safety discipline practices are:
  - (1) **Thinking Before Acting.** Employees are responsible for thinking about the consequences of their actions before they act and to take precautions to prevent injury. Taking a chance or a "calculated risk" is not acceptable.
  - (2) **Complying with Safety Rules.** Employees are responsible for complying with all posted safety rules and safety procedures that they have been taught.
  - (3) **Following Established Safe Work Practices.** Once an employee has been taught the safe way to perform a particular task they are responsible for following the established procedures. If the employee believes the procedures are unsafe they should speak up and discuss their concerns with their supervisor.
  - (4) **Taking Full Advantage of Safety Training.** Employees should take advantage of safety training provided. They should actively participate in the instruction and question anything they do not fully understand.
  - (5) **Wearing Personal Protective Equipment (PPE).** Employees are responsible for wearing the proper personal protective equipment (PPE) when a task requires it. They are also responsible for maintaining, inspecting, and reporting any defects of their PPE to their supervisor.
  - (6) **Keeping Work Areas Clean.** Employees are responsible for keeping their own work areas clear and common aisles and workspaces clean. (Note: Some common workspaces may fall under the responsibility of laborers).
  - (7) **Keeping Machine Guards & Safety Devices in Place.** Employees are responsible for keeping all guards and other safety devices in place when operating machinery or tools that require them. They should "red tag" and report all defective tools to their supervisor. They should never disable any safety switch, guard, or other safety device.
  - (8) **Preventing Unsafe Manual Lifting & Handling.** Because back injuries and other strains are among the most frequent and costly injuries in the workplace, employees must take responsibility for preventing these types of injuries. They should avoid unnecessary manual lifting and carrying by using carts, hand trucks, and mechanical lifting devices instead. They are responsible for getting help with a large, bulky, or heavy load and not lift or move it themselves. They must practice proper lifting techniques at all times.

### Section 3. Serious Incident Investigation Procedures.

#### A. General.

1. While all incidents shall be investigated, the extent of such investigation shall reflect the seriousness of the incident utilizing a root cause analysis process.
2. The following procedure is to be followed to secure serious incident sites until the arrival of the project manager or a designated owner's representative as applicable. NOTE: It is common for media representatives to show up at an accident scene. Any inquiries from the media (reporters, etc.) are to be directed to contact a Company spokesperson. DO NOT simply say "No comment". Better to say "We are in the midst of completing our investigation. Give me your name and number and I will have someone call you when we have the facts about this matter".

#### B. Actions.

1. Immediately following an occurrence, the following actions shall be taken by the Job Foreman, Superintendent, Project Manager or his/her designee:
  - a. Secure and Preserve Evidence: The accident site shall be secured as soon as possible. Record the existing scenes and conditions with a liberal amount of photographs. Accident scenes shall not be disturbed until released by the project manager and/or owner's representative (as applicable) except where rescue and emergency measures dictate a need.
    - (1) Initial identification of evidence immediately following the incident might include a listing of people, equipment, and materials involved and a recording of environmental factors such as weather, illumination, temperature, noise, ventilation, and physical factors such as fatigue, age, and medical conditions.
  - b. Identify witnesses and secure statements as outlined in section 5 of this procedure.
  - c. Amelioration: Preliminary investigation findings shall be reported by the project manager who will advise the designated owner's representative of ameliorative actions where the initial investigation reveals an immediate need for improvement to preclude future incidents.
2. Once the designated owner's representative and/or safety investigator arrives, the project manager will make available to him/her information obtained in the preliminary investigation. (Accidents which result in loss of life will be immediately reported by the project manager or his/her designee to the designated owner's representative by the most expeditious means. All accidents shall be promptly investigated.)
3. The Job Foreman/Superintendent shall promptly give the Project Manager and/or owner's representative, a copy of the employer's first report of injury for all injured personnel referred to a physician.
4. The Division Manager/appropriate Executive Vice President shall be notified immediately for all site emergencies, fatalities and severely disabling injuries. They shall then promptly notify the Corporate VP of Operations and the Director of Safety.
5. The Director of Safety shall verbally report required incidents to OSHA within 8 hours of their discovery and to the owner client as soon as possible, or in a timely manner (within 24 hours of incident).
  - a. Within eight (8) hours after the death of any employee from a work-related incident or the in-patient hospitalization of three or more employees as a result of a work-related incident, you must orally report the fatality/multiple hospitalization by telephone or in person to the Area Office of the Occupational Safety and Health Administration (OSHA), U.S. Department of Labor, that is nearest to the site of the incident. You may also use the OSHA toll-free central telephone number, 1-800-321-OSHA (1-800-321-6742).

#### C. Investigations.

1. The investigation should be conducted as soon as possible. The investigation must be fact-finding, not fault finding. The purpose is to learn the true cause so that similar accidents/incidents can be prevented, and to determine facts bearing on liability. Incident investigations should result in corrective actions. The investigating team should include the Project Manager as well as the Job Foreman/Superintendent, or his/her designee. Outside participation in the investigation may also include investigators and consultants as decided by Company Management.

2. Flag or rope off the scene of the accident until all investigations are completed (project, insurance, client, OSHA, local authorities, etc.). Do not remove or alter anything. (A security guard may be needed to ensure against unauthorized entry or removal.)

3. All personnel assigned to the operation and all witnesses to the accident should be interviewed individually and in private and written statements taken as soon as possible. If the worker's compensation insurance adjuster is present, project management and the adjuster may interview the employees jointly (see standard witness form, Attachment 1). A copy of the statement must be given to the witness. It is important that the witnesses relate only first hand factual knowledge of what they actually observed. (Opinions, speculations, hearsay or ideas are not factual knowledge.) As a minimum the following questions should be asked of each person and witness involved:

- a. Where were you when the accident took place?
- b. What activity was being performed by those involved prior to the accident/incident?
- c. What activity were you performing at the time of the accident/incident?
- d. What materials, equipment, or conditions were involved? Include all contributing factors.
- e. What did you see take place?
- f. Why did it happen? Include all unsafe conditions and/or unsafe acts.
- g. Was there a previously known and/or reported problem or condition associated with the accident/incident?

4. If equipment, tools or materials are involved in the accident/incident, they should be tagged or permanently marked for positive identification. The person tagging the item should be identified. The items should then be placed in safekeeping.

D. Photographs and Drawings.

1. Each project must have access to a digital or disposable camera with flash available for accident investigation. Drawings must be marked up and/or sketches prepared to indicate the location of the accident. All measurements such as time, distance, etc. must be accurate. Photographs must be taken as soon as possible since conditions often change rapidly. The photographs must contain the following information: description and location of the principal item(s), date and time, name of photographer. Photographs should be taken from as many angles as possible.

E. Reports.

1. A complete and comprehensive report must be completed as soon as possible after the accident/incident. At a minimum, the report must contain the following information:

- a. Chronological order of all events, listed by dates, times, names, meetings, etc. and comment on all relevant events.
- b. Initial Accident Investigation Report(s)
- c. Drawings/Blue prints
- d. Law enforcement investigation report if available/applicable
- e. Coroner's report if available/applicable
- f. Personnel information on all injured employee(s)
- g. Worker's compensation form
- h. Statements of witnesses
- i. Copies of newspaper clippings
- j. Photographs
- k. Summary of possible causal factors

2. When the report is complete, it must be reviewed by the applicable Division Manager, Human Resource Administrator and/or other personnel as deemed appropriate by Company and/or Corporate Management.

3. Lessons learned should be reviewed and communicated. Changes to processes must be placed into effect to prevent reoccurrence or similar events.

F. Training.

1. Personnel should be trained in their roles and responsibilities for incident investigation techniques. Project managers and foreman designated to conduct investigations will review MCAAs training DVD *The Right Approach: Accident Investigation for the Mechanical Trades*.

## Section 4. OSHA – Handling OSHA Visits and Citations.

### A. General.

1. All visits by OSHA personnel and any subsequent receipt of citations, as the result of inspection activities on Company projects will be coordinated through the Company project manager and Director of Safety.

### B. OSHA Visits.

1. All OSHA compliance officers will be directed to the Company's project manager or lead foreman on site. Notification will then be made to the Director of Safety.
2. The project manager or lead foreman will immediately notify Company management of the OSHA representative(s) arrival and stated reason for the visit.
3. The OSHA compliance officer will be asked to hold a pre-inspection conference with Company project management and a union representative. If the visit is directed at a subcontractor, the appropriate subcontractor will be notified and requested to send a representative to the pre-inspection conference.
4. During any inspection by OSHA compliance personnel, a member(s) from the Company's project management team will accompany the compliance officer. **The Company representative shall take appropriate notes during the inspection and shall also take photographs to correspond with those taken by the compliance officer. "Appropriate frames of reference" should be indicated with the photographs (i.e. trench depth measurements, include object of known size in the photograph for perspective).**
5. The Company representative should restrict OSHA compliance personnel's access to the jobsite area within the scope of the purpose of the inspection unless compliance personnel were invited by a construction manager or general contractor of which the Company is subordinate to.

### C. Receipt of OSHA Citation(s).

1. Any OSHA citation(s) received by a Company will be directed to the Safety Director who will:
  - a. Immediately notify Company executive management.
  - b. In coordination with legal counsel (as applicable):
    - (1) Coordinate response to the citation(s) as well as preparation for the appeal process with management.
    - (2) Prepare a letter of appeal, as required, for the applicable project manager and/or president's signature.
    - (3) All correspondence to any OSHA office which involves a citation(s) will be forwarded certified mail - return receipt requested.
    - (4) NOTE: All subsequent handling of the citation(s) and the appeal process will be coordinated by the Company's Counsel and/or his designee.

### D. Subcontractor OSHA Citations.

1. If a subcontractor receives a citation as the result of alleged violations, the subcontractor will notify Company project management within 24 hours. Project management will request the subcontractor to forward copies of the citation to the applicable Company project manager.

## Section 5. General Safety Information.

### A. Alcohol / Substance Abuse.

1. Employees who report for work intoxicated or under the influence of illegal drugs, or any employee drinking alcoholic beverages or using illegal drugs on the job, will be subject to termination.
2. Employees should report to their supervisor anyone they may suspect is under the influence of alcohol or illegal drugs.
3. It is forbidden for any employee to be under the influence or impaired by the use of alcohol, prescription medicines, legal or illegal drugs, or any other such substances while driving or operating a Company vehicle, rental car, or personal vehicle on Company business
4. The sale or intent to sell prohibited substances at any jobsite or facility is strictly forbidden.
5. NOTE: For some jobs, in some states, the Company, general contractor, or owner as a pre-employment requirement will require drug testing. The Company may also require testing of current employees, unless otherwise limited by law, when reasonable suspicion exists; when an employee is found in possession of any controlled substance, drug or alcohol; when an accident, near-miss, or incident occurs (referred to as "post-accident"); during and/or after an employee has participated in a rehabilitation program; and when required by state or Federal law. Employees covered under a Collective Bargaining Agreement should contact their local union representative for information regarding their Employee Assistance Program and Employee Drug and Alcohol Program.

### B. Emergency Response / Evacuation Plan.

1. Supervisors have the authority and the ability to stop work if workers and/or the surrounding areas become unsafe or if emergency procedures need to be enacted. Evacuation procedures will comply with the business owner's or general contractor's existing plan, if present.
2. Emergency action plans must be in writing, kept in the workplace, and available to employees for review.
3. Emergency action plans must include, at a minimum:
  - a. Procedures for reporting a fire or other emergency.
  - b. Procedures for emergency evacuation, including type of evacuation and exit route assignments.
  - c. Procedures to account for all employees after evacuation.
  - d. The name or job title of employee who may be contacted by employees who need more information about the plan or an explanation of their duties under the plan.
  - e. An alarm system distinctive and recognizable as a signal to evacuate the work area or perform actions designated under the emergency action plan.
    - (1) For those employers with 10 or fewer employees in a particular workplace, direct voice communication is an acceptable procedure for sounding the alarm provided all employees can hear the alarm.
4. Emergency action plans will be reviewed with employees:
  - a. When the plan is developed or the employee is assigned initially to a job.
  - b. When the employee's responsibilities under the plan change.
  - c. When the plan is changed.
5. Standard evacuation procedures, pending site specific instructions, will be:
  - a. Employee notification of an emergency situation via alarm system or verbal contact.
  - b. Notify surrounding co-workers to clear the area.
  - c. Follow designated evacuation routes - do not deviate; exit via the nearest and safest exit.
  - d. Keep aware of unusual leaks, spills, or odors and choose another exit route if you detect or sense a hazard.
  - e. After exiting the building, proceed in a calm, orderly fashion to designated relocation area(s).
  - f. The Company's supervision will be responsible for employee head-counts and reporting findings to the proper authorities.
  - g. Remain in the relocation area until the "all clear" announcement is given; return to the work area only after The Company's supervision has given the okay.

- h. Emergency numbers will be posted on site for your use should the need arise. Normally, "working facilities" will have their own in-house emergency response team(s) and emergency phone numbers.
- i. All company employees will receive emergency response/evacuation training prior to commencing work.

C. First Aid.

1. Each jobsite and fabrication facility will have adequate first aid supplies to meet the needs of employees normally present during a work shift. First aid kits will be inspected as part of the jobsite inspection process to ensure they are fully stocked and the supplies and equipment meet minimum standards. First aid kits shall consist of appropriate items which will be adequate for the environment in which they are used. For construction operations, items shall be stored in a weather proof container with individual sealed packages of each type of item.
2. When the Company offers and supplies training in First Aid and CPR to employees they will be covered under the provisions and protection of the Blood Borne Pathogens Standard. This policy applies to all first aid and/or CPR-trained employees who are to realize that the rendering of first aid and/or CPR is strictly "voluntary" and not a required part of their job assignment, and that they may come in contact with human blood or bodily fluids as a result of a "Good Samaritan" act in treating an injured person.
3. Proper equipment for prompt transportation of the injured person to a physician or hospital or a communication system for contacting necessary ambulance service shall be provided.
4. Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities shall be provided within the work area for quick drenching or flushing.
5. In the absence of an infirmary, clinic, hospital, or physician, that is reasonably accessible in terms of time and distance to the worksite, which is available for the treatment of injured employees, a person who has a valid certificate in first aid shall be available at the worksite to render first aid. A valid certificate in first aid training must be obtained from the American Red Cross, or equivalent training, that can be verified by documentary evidence.
6. Emergency medical treatment shall be provided by calling "911" and providing the jobsite address and medical emergency situation.
7. Non-emergency medical treatment requiring for than first aid will be provided by transporting the injured worker via company vehicle to the closest occupational health facility.

D. Hazard Communication (HAZCOM).

1. The Company has developed a Hazard Communication (HAZCOM) Program to provide information and training for all employees who may be exposed to hazardous substances in the workplace.
2. The Company's HAZCOM Program information and training system is comprised of the following:
  - a. Written Program - All jobsites and work facilities will actively participate in the HAZCOM Program. A copy of the written HAZCOM Program will be available for viewing by any employee upon request.
  - b. Hazard Determination - The Company does not intend to evaluate any of the hazardous substances purchased from vendors and/or manufacturers, but has chosen to rely upon the evaluation performed by the manufacturers of the products to satisfy the requirements for hazard determination.
  - c. Container Labeling - No containers will be released for use unless the container is properly labeled and the label is legible. Report any unlabeled containers to your supervisor immediately and DO NOT USE the contents. Any container found to have a damaged or unreadable label will be quarantined until proper labeling has been accomplished.
  - d. Material Safety Data Sheets (MSDS) - Copies of all manufacturer MSDS's for any hazardous substance to which our employees may be exposed will be maintained on file and made available to each employee upon request. An MSDS will supply you with all of the known information on a given hazardous substance, including, but not limited to:
    - (1) Chemical name
    - (2) Manufacturer's information
    - (3) Hazardous ingredients
    - (4) Physical and chemical characteristics
    - (5) Fire and explosive hazards
    - (6) Reactivity
    - (7) Health hazards
    - (8) Precautions for safe handling and use
    - (9) Control measures, including personal protective equipment
3. New substances will not be introduced into the workplace without a proper MSDS on file. All affected employees will be notified when a new substance is received or additional information is received on an existing substance. An inventory list of all of The Company's furnished hazardous substances to which employees may be exposed will be kept at all times on the project site, along with MSDS.
4. Employee Information and Training. All employees shall be provided with information and training on hazardous substances in their work area at the time of their initial assignment, and whenever a new hazard is introduced into their work area. Training shall include:
  - a. An overview of the requirements of The Hazard Communication Standard, which includes their rights under this regulation.
  - b. Information regarding the use of hazardous materials in their respective work areas.
  - c. The location and availability of The Company's written program.
  - d. The physical and health aspects of the hazardous materials presently in use.
  - e. Methods and observation techniques used to determine the presence and/or release in the work area(s).
  - f. The controls, work practices, and personal protective equipment which are present and available for employee protection.
  - g. Emergency and first aid procedures to follow should an employee(s) become exposed to hazardous substances.
  - h. How to read and understand container labels and MSDS.

E. Incident Reporting.

1. All incidents and injuries shall be reported to supervision immediately, even if it only means a trip to the first aid kit! More serious injuries requiring medical treatment shall be handled by means of a medical facility set-up in your local area (see employee posting area for details). The phone number to this medical facility shall be posted as part of the jobsite emergency phone number list. On "Controlled Insurance Program" projects (OCIP, CCIP, TCIP, etc.), employees that are injured will report to the owner's or general contractor's first aid station. The medical personnel assigned to this station will determine a course of action to be taken in response to the injury. **THIS DOES NOT RELIEVE SUPERVISION OF THEIR RESPONSIBILITY TO COMPLETE THE SUPERVISOR'S REPORT OF INJURY.**

2. See Figure 18 – **Incident Report** at the end of this manual.

3. See Figure 19 – **Supervisor's Accident Report** at the end of this manual.

F. Inspections.

1. Each jobsite will be routinely inspected by the Project Manager and/or Foreman.

2. The Project Manager should complete a Jobsite Inspection form at least monthly.

3. The Foreman should complete a Jobsite Inspection form at least weekly.

4. The Director of Safety & Back Shop Operations will perform inspections as warranted by each jobsite and scope of work.

5. See Jobsite Inspection form at the end of this manual.

G. Job Hazard Analysis (JHA).

1. JHAs have proven to be one of the best tools to alleviate construction incidents. JHA are required for projects with scopes of work involving high-risk work tasks. The hazard identification process should be used for routine and non-routine activities as well as new processes, changes in operation, products or services as applicable. Construction Managers may also require them for all tasks on certain jobsites. See Form 16 – **Job Hazard Analysis** at the end of this manual.

2. JHAs are developed to address controls, procedures, steps, Personal Protective Equipment (PPE), etc., needed to safely accomplish a work task.

3. The Foreman involves employees and/or sub-contractors in the hazard identification process. The hazards should be classified and ranked based on severity. Once all hazards have been identified the Foreman develops the JHA and obtains approval from his/her supervisor.

4. Supervisors approving JHAs should ensure all identified hazards are addressed and mitigated properly.

5. Once approved the Foreman meets with his entire crew to review the JHA. All workers involved sign the JHA form to document that safety training was provided and that the JHA process was completed.

6. Jobsite supervision shall review all JHAs for completeness, accuracy, quality and acknowledge review by signing the form.

7. Some construction tasks are repetitive. Common tasks have been compiled into a Job Hazard Analysis Booklet. The booklet may be used as a reference or starting point in the development of a jobsite specific JHA.

8. Employees should be trained in the hazard identification process. Supervisors should review MCAAs DVD *Reduce The Risk: Pre-Task Safety and Health Planning for Supervisors*. Training topics include:

- a. Identify potentially hazardous tasks.

- b. Conduct task hazard analyses.

- c. Implement corresponding safe work practices.

H. Workplace Violence.

1. The Company is committed to maintaining a safe, healthful, and efficient working environment where employees and clients are free from the threat of workplace violence. Acts or threats of physical violence, including intimidation, harassment, and/or coercion which involve or affect the Company or which occur on Company premises, will not be tolerated.

2. This prohibition against threats and/or acts of violence applies to all persons involved in the operation of the Company, including, but not limited to, Company personnel, contract and temporary workers, and anyone else on Company or client property.
3. Violations of this policy by any individual will lead to disciplinary and/or legal action as appropriate.
4. Any employee who has been threatened, is the victim of a violent act, witnesses any threat or violent act, or gains knowledge of any threat or violent act is to report such activity to his/her supervisor and the Human Resources Department immediately.

i. Workers' Compensation and Medical Treatment.

1. All employees, regardless of classification, are eligible for Workers' Compensation in the event of an occupational injury or occupational illness according to applicable state law.
2. If you experience an occupational injury or illness, you must **immediately** notify your supervisor or Safety Representative to ensure proper documentation and timely medical care is provided. Your supervisor or Safety Representative will arrange for first aid, emergency care, or other medical care as necessary based on your injury or illness. The Company may designate that you be treated by a specific medical provider for up to 30 days following the date of injury or illness, or as otherwise required by state law.
3. Your Human Resources Representative will file the appropriate State Report of Injury.
4. Failure to timely report an injury may lead to denial in workers' compensation by the insurance carrier. For this reason it is important that you immediately report any injury, soreness, or first aid self-treatment caused by a jobsite work function.
5. Once your claim for Workers' Compensation is approved by The Company's Worker's Compensation Insurance Carrier or the applicable state agency, you will be eligible for reimbursement of your medical expenses incurred because of the injury or illness and compensation as determined by state law. You may be required to complete and sign part of the Injury Report.
6. **Be sure to let your treating physician know that the Company will make all efforts to accommodate a modified or light-duty work status should he/she indicate is acceptable.** You must remain within your work restrictions to help your healing process.
7. If your physician prescribes physical therapy you should make every attempt to keep your appointments and follow the therapist's instructions to help your healing process.
8. If you are placed in a no-work status, maintain contact with the Company to help keep appropriate personnel informed of your status. The Director of Safety or a Human Resources representative may contact you to gather information to complete any required reports.

## Section 6. Safe Work Practices.

### A. General.

1. The following describes basic safe work practices.
2. For detailed information see the specific sections in this manual or those published separately as indicated.

### B. Aerial lifts.

1. Aerial lifts are devices to elevate workers to areas that cannot be reached from walking/working surfaces. They include, but are not limited to, scissor lifts, extensible boom platforms, articulating boom platforms, and vertical towers.
2. General.
  - a. Never operate a lift until you have received the proper training.
  - b. Obey operating instructions, warnings and cautions for each lift.
  - c. Visually inspect the lift before using it, and test the controls to ensure that they are in good condition and functioning properly. Complete the Aerial Lift Inspection form prior to each shift and keep the completed form with the lift. At the end of each week give the completed form(s) to your supervisor. See Aerial Lift Inspection form at the end of this manual.
  - d. Never use a ladder, bucket, or other objects to extend your reach.
  - e. Never step up on the midrail or toprail to extend your reach.
  - f. Always keep both feet planted firmly on the floor of the basket or platform.
  - g. Use a personal fall restraint system whenever the manufacturer recommends it or it is required by the Contract Manager/General Contractor. The system should include a full body harness and lanyard.
  - h. Never attach the lanyard to anything other than the manufacturer's designated anchorage point on the lift.
  - i. Never tie-off to objects outside the lift.
  - j. Ensure that gaits or chains are properly closed and latched.
  - k. Enter and exit the platform or basket from the ground level only. While exiting a scissor lift ensure you face the lift instead of jumping out and down. Use caution and check your dismount area first.
3. Lift movement.
  - a. Never operate a lift on soft ground or unlevel surfaces.
  - b. Lower the basket or platform to ground level before moving the lift.
  - c. Never move a lift with the outriggers extended.
  - d. Use a spotter to help you back the lift safely.
4. Operation.
  - a. Set the brakes if equipped.
  - b. Level and stabilize the lift by extending the outriggers.
  - c. Check the area carefully for obstructions before positioning the basket or platform.
  - d. Never exceed boom or basket load limits.

### C. Asbestos.

1. Asbestos is a mineral-based material that is resistant to heat and chemical corrosion. Prior to 1980 it was used in the production of many building materials such as pipe wrap, boiler wrap, ceiling tiles, floor tiles, fireproofing materials, insulation, and wallboard. Asbestos can be harmful to workers if it is inhaled or swallowed.
2. General.
  - a. Assume that building materials installed before 1980 contain asbestos.
  - b. When such materials would easily crush, crumble or come apart, sending particles into the air, leave the area immediately and inform your supervisor.
3. Working around asbestos.
  - a. Before working around suspect building materials, make sure you have the proper training and respiratory protection.

- b. Do whatever is necessary (i.e. wet method, respirator use, HEPA ventilation systems, etc.) to protect yourself from overexposure.
- c. Wear coveralls and use the appropriate class and type respirator while working around suspect building materials, unless sample tests or air monitoring results indicate no risk of overexposure.
- d. Carefully follow the appropriate decontamination procedure before leaving the worksite, including showering, changing clothes and properly storing contaminated clothing.

**D. Benzene.**

- 1. Possible locations where employees may be exposed to Benzene during their job functions. Some examples may include, but not limited to:
  - a. Petroleum refining sites.
  - b. Tank gauging (tanks at producing, pipeline & refining operations).
  - c. Field maintenance.
- 2. Every effort will be made to avoid locations where benzene is used or stored.
- 3. Characteristics. Benzene is toxic, colorless, has an aromatic odor, is not soluble in water and is flammable.
- 4. Potential health effects of benzene:
  - a. Short term effects of overexposure may include: irritation of eyes, nose and skin, breathlessness, irritability, euphoria, headache, dizziness, or nausea.
  - b. Long term effects may result in blood disorders such as leukemia and anemia.
- 5. Necessary PPE required for benzene include:
  - a. Eye/face. Safety glasses. Chemical goggles recommended to prevent injury from splashing.
  - b. Skin, hands, feet. Chemically resistant gloves, footwear and apron. Cotton or wool clothing. Avoid synthetics due to static electricity.
  - c. Respiratory. If ventilation is not sufficient NIOSH approved air-purifying respirator should be used.
- 6. Smoking is prohibited in areas where benzene is used or stored.
- 7. Benzene liquid is highly flammable and vapors may form explosive mixtures in air. Fire extinguishers must be readily available in areas where benzene is used or stored.
- 8. Employees should be aware of owners' contingency plans and provisions. Employees must be informed where benzene is used in the host facility and aware of additional plant safety rules

**E. Bloodborne pathogens.**

- 1. Bloodborne pathogens are microorganisms in human blood and other body fluids that cause diseases such as hepatitis B (HBV) and acquired immunodeficiency syndrome (AIDS).
- 2. General.
  - a. Be aware of bloodborne pathogen hazards when responding to an injury or working in places where human blood or body fluids might be present, such as health care facilities, nursing homes, dental facilities, funeral homes and wastewater treatment plants.
  - b. Use the appropriate personal protective equipment (PPE) to prevent human blood and body fluids from contacting your eyes, nose, mouth, or open cuts, punctures or abrasions in the skin. Wear:
    - (1) Safety glasses or goggles
    - (2) Medical exam gloves (use latex-free gloves if you have a latex allergy).
    - (3) A surgical mask that covers your nose and mouth, or a face shield
  - c. Thoroughly wash your hands and face with warm, soapy water immediately after exposure to human blood or body fluids.
- 3. Employees trained by the Company to perform First Aid & CPR are covered under the Bloodborne Pathogens Standard and shall follow the Bloodborne Pathogens Procedures manual published under separate cover.

**F. Boom Lifts (See Aerial Lifts).**

**G. Cadmium.**

1. Operations involving the heating of cadmium-plated or cadmium-containing parts, such as welding, brazing, and soldering, may produce a high concentration of cadmium oxide fumes. Cadmium (CAS No. 7440-43-9) and cadmium compounds are known to be human carcinogens. In its elemental form, cadmium is either a blue-white metal or a grayish-white powder found in lead, copper, and zinc sulfide ores, but most cadmium compounds are highly colored from brown to yellow and red. Cadmium uses vary from an electrode component in alkaline batteries to a stabilizer in plastics.
2. Permissible Exposure Limit (PEL). The employer shall assure that no employee is exposed to an airborne concentration of cadmium in excess of five micrograms per cubic meter of air (5 ug/m<sup>3</sup>), calculated as an eight-hour time-weighted average exposure (TWA).
3. Employees exposed to a known cadmium hazard will follow the Cadmium procedures published separately. The purpose of this program is to ensure there are procedures to limit the spread of cadmium hazards, that the requirements are implemented, evaluated, and that the proper hazard information is transmitted to all affected employees.

H. Carbone Monoxide.

1. Carbon monoxide is a colorless, odorless, tasteless gas generated by internal combustion gasoline and diesel engines and some hot work operations such as welding.
2. General.
  - a. When working around sources of carbon monoxide, ensure that the area is well ventilated.
  - b. If the area does not appear to be well ventilated, leave it immediately and seek fresh air. Your body's senses cannot help you determine whether carbon monoxide is present.

I. Common Chemical Substances.

1. Chemical substances, such as caustics, solvents, paints, glues, adhesives and cements, are used for a variety of work tasks.
2. General.
  - a. Protect yourself from these substances by ensuring that they do not enter your body.
  - b. Use the proper personal protective equipment such as gloves, goggles, face shields, aprons and, when necessary, respirators to keep from inhaling, ingesting, injecting or absorbing chemical substances into your body.
  - c. Always review the Material Safety Data Sheet (MSDS) when not familiar with the manufacturer's requirements.

J. Compressed Air.

1. Compressed air is air forced into containers under extreme pressure.
2. General.
  - a. Before using compressed air for cleaning, ensure there are no hazardous substances that could become airborne when compressed air is released.
  - b. Reduce the pressure to less than 30 pounds per square inch (psi) before using compressed air for cleaning.
  - c. Wear chip guarding and safety glasses when using compressed air for cleaning.

K. Compressed Gas Cylinders.

1. Compressed gas cylinders are containers of gases that have been reduced in volume by pressure. Some common compressed gases in the mechanical construction industry are acetylene, oxygen, nitrogen and propane.
2. General.
  - a. Protect yourself and others from fire, explosion and struck-by hazards caused by inappropriate use or treatment of compressed gas cylinders.
  - b. Keep compressed gas cylinders secured in an upright position at all times.
  - c. Close the cylinder valves:
    - (1) as soon as work is completed
    - (2) when cylinders are empty
    - (3) before transporting, moving or storing.
  - d. Make sure valve protection caps are in place before transporting, moving or storing.
  - e. Never use cylinders as rollers or supports.

- f. Damaged or defective cylinders shall not be used.
3. Storage.
    - a. Store cylinders in a dry, well-ventilated area at least 20 feet from combustible materials. Also store gas hoses in dry, well-ventilated areas too.
    - b. Store oxygen cylinders at least 20 feet from fuel gas cylinders such as acetylene, or separate them with a 1/2-hour non-combustible barrier at least 5 feet high.
    - c. Never store cylinders in gang boxes, lockers or other poorly ventilated areas.
    - d. When storing inside buildings make sure they are stored in well-protected and well-ventilated areas. Never store near elevator shafts, stairs, or gangways.
    - e. Secure cylinders in suitable cylinder truck, chain, or other steadying device. Cylinders may also be wire-tied to a secure device such as a building column.
    - f. Never take oxygen or fuel gas cylinders into confined spaces.
  4. Transporting.
    - a. Cylinders may be manually moved by tilting them and rolling them on their bottom edges.
    - b. Ensure cylinders are secured in their upright position when transporting by powered vehicle.
    - c. Make use of available cylinder carts when manually moving.
    - d. Cylinders must be closed with regulators removed, and have their valve protection cap in place prior to moving unless firmly secured in a special carrier intended for cylinder transport.
    - e. When hoisting, they shall be secured on a cradle, slingboard, or pallet. They shall not be hoisted by means of choker slings.
  5. Operational Use.
    - a. Keep cylinders away from ignition sources such as sparks, hot slag and flames, or isolate them with fire-resistant shields.
    - b. Keep cylinders away from all sources of electricity, so they will never become part of an electrical circuit.
    - c. Keep cylinder valve wrenches in place while the valves are open so they can be shut off quickly if necessary.
    - d. Inspect regulators and torches before each use. Do not use them if they appear damaged.
    - e. Do not use regulators or torches that appear to be malfunctioning. Immediately follow the Company's procedure for taking defective equipment out of service.
    - f. Use only friction lighters to ignite torches.
    - g. Use anti-flashback arrestors at the torch end as a minimum.
  6. Connecting to fuel gas cylinders.
    - a. Employees will be instructed in the safe use of fuel gas, as follows:
      - (1) Before a regulator to a cylinder valve is connected, the valve shall be opened slightly and closed immediately. (This action is generally termed "cracking" and is intended to clear the valve of dust or dirt that might otherwise enter the regulator.) The person cracking the valve shall stand to one side of the outlet, not in front of it. The valve of a fuel gas cylinder shall not be cracked where the gas would reach welding work, sparks, flame, or other possible sources of ignition.
      - (2) The cylinder valve shall always be opened slowly to prevent damage to the regulator. For quick closing, valves on fuel gas cylinders shall not be opened more than 1 1/2 turns. When a special wrench is required, it shall be left in position on the stem of the valve while the cylinder is in use so that the fuel gas flow can be shut off quickly in case of an emergency. In the case of manifolded or coupled cylinders, at least one such wrench shall always be available for immediate use. Nothing shall be placed on top of a fuel gas cylinder, when in use, which may damage the safety device or interfere with the quick closing of the valve.
      - (3) Fuel gas shall not be used from cylinders through torches or other devices which are equipped with shutoff valves without reducing the pressure through a suitable regulator attached to the cylinder valve or manifold.
      - (4) Before a regulator is removed from a cylinder valve, the cylinder valve shall always be closed and the gas released from the regulator.

- (5) If, when the valve on a fuel gas cylinder is opened, there is found to be a leak around the valve stem, the valve shall be closed and the gland nut tightened. If this action does not stop the leak, the use of the cylinder shall be discontinued, and it shall be properly tagged and removed from the work area. In the event that fuel gas should leak from the cylinder valve, rather than from the valve stem, and the gas cannot be shut off, the cylinder shall be properly tagged and removed from the work area. If a regulator attached to a cylinder valve will effectively stop a leak through the valve seat, the cylinder need not be removed from the work area.
- (6) If a leak should develop at a fuse plug or other safety device, the cylinder shall be removed from the work area.

#### L. Confined Spaces.

1. **Definition.** A confined space is any space that can be entered by a worker but is not designed for continuous worker occupancy, and which has limited or restricted entrance and exit ways. Confined spaces include, but are not limited to: pits, process vessels, utility vaults, bins, pipelines, tunnels, shafts, sewers, manholes, boilers and ducts.
2. **General.**
  - a. Find out who the Company is designated as the "competent person" for the confined space in which you will be working. **Personnel must be trained prior to entering any confined space.** "Competent person" means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.
  - b. Never enter a confined space until your supervisor authorizes you to do so. The space must be tested to determine whether the atmosphere inside is hazardous. The "competent person" will test for oxygen content, toxic gases and flammable/explosive atmospheres.
  - c. Never enter a confined space that has a hazardous atmosphere until you have received the proper training and are wearing the proper personal protective equipment (PPE).
  - d. Follow all of the safe work practices covered in your training, which include information such as proper use of ventilation systems, air monitoring, monitor alarm systems, PPE, emergency egress equipment and procedures, and confined space attendants.
  - e. Remember that welding, cutting or any kind of hot work inside a confined space can create a hazardous atmosphere. Use an adequate ventilation system and monitor the air to ensure that the atmosphere is not hazardous.
  - f. If a co-worker collapses inside a confined space, do not attempt a rescue unless you have received the proper training and have the equipment you need to perform the rescue safely.
3. There are two types of confined spaces:
  - a. **Confined Space.** A confined space is defined as any location that meets all of the following:
    - (1) Limited openings for entry and egress,
    - (2) Is not designed or intended for continuous employee occupancy, and
    - (3) Is so enclosed that natural ventilation may not reduce air contaminants to levels below the threshold limit value (TLV).
  - b. **Permit-Required Confined Space.** A permit-required confined space has all of the conditions of a confined space and at least one of the following:
    - (1) Contains an atmosphere that is flammable or explosive, or has the potential to contain a hazardous atmosphere (this can be in the space already or introduced by workers using material or equipment such as flammable gasses for welding or paints that give off fumes such as epoxy paint when heated).
    - (2) Contains the potential for engulfment.
    - (3) Internal configuration that can trap or asphyxiate an entrant.
    - (4) Any other serious safety or health hazards.
4. **Responsibilities.**
  - a. **Entry Supervisor.** Entry Supervisor shall be qualified and authorized to approve confined space entry permits. Entry Supervisor(s) shall be responsible for:

- (1) Knowing the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
  - (2) Determining if conditions are acceptable for entry.
  - (3) Terminating entry procedures as required.
  - (4) Ensuring measures are in place to keep unauthorized personnel clear of the area.
  - (5) Verifying, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin.
  - (6) Conducting a briefing with all involved participants to ensure they know the hazards, their duties, and the rescue procedures.
  - (7) Authorizing entry and overseeing entry operations.
  - (8) Checking the work at least twice a shift to verify and document permit requirements are being observed (more frequent checks shall be made if operations or conditions are anticipated that could affect permit requirements).
  - (9) Ensuring necessary information on chemical hazards is kept at the worksite for the employees or rescue team.
  - (10) Verifying rescue services are available and that the means for summoning them are operable. And, if using a rescue team, ensure the members have current certification in first aid and cardiopulmonary resuscitation (CPR).
  - (11) Removing unauthorized individuals who enter or who attempt to enter the permit space during entry operations.
  - (12) Terminating the entry and canceling the permit as required.
- b. Attendants.
- (1) Attendants shall be stationed immediately outside of the permit-required confined workspace. If an Attendant has to leave the immediate area he/she will ensure all Entrants exit the space before he/she leaves.
  - (2) Attendants shall not engage in other duties that prevent them from performing their required Attendant duties.
  - (3) Attendants are limited to monitoring one permit-required confined space at any one time.
  - (4) Be knowledgeable of, and be able to recognize potential confined space hazards.
  - (5) Maintain a sign-in/sign-out log with a count of all persons in the confined space, and ensure all entrants sign in and out.
  - (6) Monitor surrounding activities to ensure the safety of personnel.
  - (7) Maintain effective and continuous communication with personnel during confined space entry, work, and exit.
  - (8) Order personnel to evacuate the confined space if he/she:
  - (9) Observes a condition which is not allowed on the entry permit;
  - (10) Notices the entrants acting strangely, possibly as a result of exposure to hazardous substances;
  - (11) Notices a situation outside the confined space which could endanger personnel;
  - (12) Notices a hazard within the confined space that has not been previously recognized or taken into consideration;
  - (13) Must leave his/her work station; or
  - (14) Must focus attention on the rescue of personnel in some other confined space that he/she is monitoring.
  - (15) Immediately summon the Rescue Team if crew rescue becomes necessary.
  - (16) Keep unauthorized persons out of the confined space, order them out, or notify authorized personnel of an unauthorized entry.
- c. Entrants. Employees who are granted permission to enter a confined space shall:
- (1) Read and observe the entry permit requirements.
  - (2) Remain alert to the hazards that could be encountered while in the confined space.
  - (3) Properly use the personal protective equipment that is required by the permit.

- (4) Immediately exit the confined space when:
        - (a) Ordered to do so by an authorized person;
        - (b) Notice or recognize signs or symptoms of exposure;
        - (c) A prohibited condition exists; or
        - (d) An alarm system sounds.
      - (5) Alert Attendant(s) when a prohibited condition exists and/or when warning signs or symptoms of exposure exist.
    - d. Rescue Team. Rescue Team members shall:
      - (1) Complete a training drill using mannequins or personnel in a simulation of the confined space prior to the issuance of an entry permit for any confined space and at least annually thereafter.
      - (2) Respond immediately to rescue calls from the Attendant or any other person recognizing a need for rescue from the confined space.
      - (3) In addition to emergency response training, receive the same training as that required of the authorized entrants.
      - (4) Have current certification in first aid and CPR.
- 5. Training.
  - a. Training shall be provided so that all employees whose work is regulated by this Confined Space Program acquire the understanding, knowledge, and skills necessary for the safe performance of their duties in confined spaces. All employees who will enter confined spaces shall be trained in entry procedures. Personnel responsible for supervising, planning, entering, or participating in confined space entry and rescue shall be adequately trained in their duties prior to any confined space entry.
  - b. Training shall be provided to each affected employee:
    - (1) Before the employee is first assigned duties within a confined space;
    - (2) Before there is a change in assigned duties;
    - (3) When there is a change in permit space operations that presents a hazard for which an employee has not been trained; and
    - (4) When the Company has reason to believe that there are deviations from the confined space entry procedures required in this program, or that there are inadequacies in the employee's knowledge or use of these procedures.
  - c. General training for all participants shall include:
    - (1) Explanation of the general hazards associated with confined spaces.
    - (2) Discussion of specific confined space hazards associated with the facility, location, or operation.
    - (3) Reason for, proper use, and limitations of personal protective equipment and other safety equipment required for entry into confined spaces.
    - (4) Explanation of permits and other procedural requirements for conducting a confined space entry.
    - (5) A clear understanding of what conditions would prohibit entry.
    - (6) Procedures for responding to emergencies.
    - (7) Duties and responsibilities of the confined space entry team.
    - (8) Description of how to recognize symptoms of overexposure to probable air contaminants in themselves and co-workers, and method(s) for alerting the Attendant(s).
  - d. Entry Supervisor training shall include:
    - (1) Atmospheric monitoring,
    - (2) Proper use of monitoring instruments,
    - (3) Sampling strategies and techniques; and
    - (4) Exposure limits (PELs, TLVs, LELs, UELs, etc.).
  - e. Attendant training shall include:
    - (1) Procedures for summoning rescue or other emergency services;
    - (2) Use communication equipment; and
    - (3) Use of mechanical rescue devices.

- f. Emergency/rescue personnel training shall include:
    - (1) Rescue plan and procedures developed for each type of confined space that is anticipated to be encountered,
    - (2) Use of emergency rescue equipment,
    - (3) First aid and CPR techniques; and
    - (4) Work location and confined space configuration to minimize response time.
  - g. Refresher training shall be conducted as needed to maintain employee competence in procedures and precautions.
6. Evaluating confined spaces.
- a. Confined spaces need to be evaluated for hazards.
  - b. Survey. Competent Person shall conduct a survey of the worksite to identify confined spaces and communicate their existence to all Company employees on the worksite. The potential for flammable or explosive gases, oxygen deficiencies, and the presence of toxic or corrosive materials will be evaluated.
  - c. Hazard Re-evaluation. The Competent Person shall identify and re-evaluate hazards based on possible changes in activities or other physical or environmental conditions that could adversely affect work.
  - d. Pre-Entry Hazard Assessment. A hazard assessment shall be completed by the Competent Person prior to any entry into a confined space. The hazard assessment shall identify:
    - (1) Sequence of work to be performed in the confined space;
    - (2) Specific hazards known or anticipated; and
    - (3) Control measures to be implemented to eliminate or reduce each of the hazards to an acceptable level.
  - e. No entry shall be permitted until the hazard assessment has been reviewed and discussed with all persons engaged in the activity.
7. Hazard controls. Hazard controls shall be instituted to address changes in the work processes and/or working environment. Hazard controls must be able to either, control the health hazards by eliminating the responsible agents, reduce health hazards below harmful levels, or prevent the contaminants from coming into contact with the workers. Engineering Controls will be used first, followed by Ventilation Controls, and then Work Practice (Administrative) Controls.
- a. Engineering Controls. Engineering controls are those controls that eliminate or reduce the hazard through implementation of sound engineering practices.
  - b. Ventilation Controls. When ventilating, the space shall be ventilated until the atmosphere is within acceptable ranges. Ventilation shall be maintained during occupancy if there is a potential for atmospheric conditions to move out of acceptable ranges. When ventilation is not possible or feasible, alternate protective measures or methods to remove air contaminants and protect occupants shall be determined by the Competent Person prior to authorizing entry. When conditions necessitate and can accommodate continuous forced air ventilation, the following precautions shall be followed:
    - (1) Employees shall not enter the space until the forced air ventilation has eliminated any hazardous atmosphere.
    - (2) Forced air ventilation shall be directed so as to ventilate the immediate areas where an employee is or will be present within the space.
    - (3) Continuous ventilation shall be maintained until all employees have left the space.
    - (4) Air supply or forced air ventilation shall originate from a clean source.
  - c. Work Practice (Administrative) Controls. Work practice (administrative) controls are those controls which eliminate or reduce the hazard through changes in the work practices (i.e., rotating workers, reducing the amount of worker exposure, and housekeeping).
8. Entry permits.

- a. The Confined Space Entry Permit is the most essential tool for assuring safety during entry in confined spaces with known hazards, or with unknown or potential hazardous atmospheres. The entry permit process guides the Entry Supervisor and workers through a systematic evaluation of the space to be entered. The permit will be used to establish appropriate conditions. Before each entry into a confined space, an entry permit will be completed by the Entry Supervisor. See Confined Space Entry Permit form in section titled Confined Space Entry in this manual. Additionally:
    - (1) Permits, such as those for hot work, may also be required.
    - (2) The entry permit shall be valid for one shift only.
    - (3) Prior to renewing a permit the entire space must be re-evaluated to include atmosphere testing.
    - (4) A new permit shall be issued whenever changing work conditions or work activities introduce new hazards into the confined space.
    - (5) Problems encountered during an entry operation shall be noted on the respective permit(s) so that appropriate revisions to the confined space permit program can be made.
  - b. Closed permits will be returned to the Director of Safety & Back Shop Operations for review and filing. The canceled permit shall be retained for at least one (1) year to facilitate the review of the Confined Space Entry Program.
9. Fall protection.
- a. Employees opening a cover that exposes him/her to a six foot or greater depth fall will be protected by an appropriate fall protection device. Any conditions making it unsafe to remove an entrance cover shall be eliminated before the cover is removed. When entrance covers are removed, the opening shall be promptly guarded by a railing, temporary cover, or other temporary barrier that will prevent anyone from falling through the opening. This barrier or cover shall protect each employee working in the space from foreign objects entering the space. If it is in a traffic area, adequate barriers shall be erected.
10. Atmospheric testing.
- a. Atmospheric test data is required prior to entry into a confined space. Atmospheric testing is required for evaluation of the hazards of the permit space, and verification that acceptable conditions exist for entry into that space. If a person must enter the space to obtain the needed data, Confined Space Entry Procedures shall be followed. Before entry into a confined space the internal atmosphere shall be tested with a calibrated, direct-reading instrument for oxygen, flammable gases and vapors, and potential toxic air contaminants, in that order. The direct-reading instruments must be calibrated every 30 days by a competent person. The atmosphere of the confined spaces shall be considered to be within acceptable limits when the following conditions are maintained: Oxygen is between 19.5 to 23.5 percent; Flammability is less than 10 percent of the Lower Flammable Limit (LFL); and Toxicity is less than OSHA Permissible Exposure Limits (PELs).
11. Isolation and lockout/tagout safeguards.
- a. All energy sources that are potentially hazardous to confined space entrants shall be secured, relieved, disconnected, and/or restrained before personnel are permitted to enter the confined space.
  - b. Equipment systems or processes shall be locked out and/or tagged out as required by section titled Lockout/Tagout (LOTO) in this manual.
  - c. In confined spaces where complete isolation is not possible, Competent Person shall evaluate the situation and make provisions for a rigorous isolation as practical.
  - d. Special precautions shall be taken when entering double-walled, jacketed, or internally insulated confined spaces that may discharge hazardous material through the vessel's internal wall.
  - e. Where there is a need to test, position, or activate equipment by temporarily removing the lock or tag or both, a procedure shall be developed and implemented to control hazards to the occupants. Any removal of locks, tags, or other protective measures shall be done in accordance with section titled Lockout/Tagout (LOTO) in this manual.

12. Ingress/egress safeguards.
  - a. Means for safe entry and exit shall be provided for confined spaces. Each entry and exit points shall be evaluated by Responsible Person to determine the most effective methods and equipment that will enable employees to safely enter and exit the confined space.
  - b. Appropriate retrieval equipment or methods shall be used whenever a person enters a confined space. Use of retrieval equipment may be waived by the Responsible Person(s) if use of the equipment increases the overall risks of entry or does not contribute to the rescue. **A mechanical device shall be available to retrieve personnel from vertical confined spaces greater than five (5) feet in depth.**
  - c. Ventilation. When ventilation is used to make a space safe the space must be tested before any entry and continuously monitored while the space is occupied to ensure the ventilation is maintaining a safe environment. **Oxygen will not be used to ventilate any space.**
  - d. Warning signs and symbols. All confined spaces that could be inadvertently entered shall have signs identifying them as confined spaces. Signs shall be maintained in a legible condition. The signs shall contain a warning that a permit is required before entry. Accesses to all confined spaces shall be prominently marked.
13. Emergency response/rescue.
  - a. Emergency Response Plan. Entry Supervisor shall maintain a written plan of action that has provisions for conducting a timely rescue of individuals within a confined space, should an emergency arise. The written plan shall be kept onsite where the confined space work is being conducted. All affected personnel shall be trained on the Emergency Response Plan.
  - b. Retrieval Systems and Methods of Non-Entry Rescue.
    - (1) Systems shall be available and ready when an authorized person enters a permit space, unless such equipment increases the overall risk of entry, or the equipment would not contribute to the rescue of the entrant.
    - (2) Retrieval systems shall have a chest or full-body harness and a retrieval line attached at the center of the back near shoulder level or above the head. If harnesses are not feasible, or would create a greater hazard, wristlets may be used in lieu of the harness.
    - (3) Retrieval line shall be firmly fastened outside the space so that rescue can begin as soon as anyone is aware that retrieval is necessary. A mechanical device shall be available to retrieve personnel from vertical confined spaces more than five (5) feet deep.
    - (4) When an entrant is the sole person in a permit-required confined space more than (5) feet deep he/she shall not disconnect from the retrieval line at any time. (This is required to enable immediate rescue without entry).
  - c. Retrieval Systems and Methods of Entry Rescue.
    - (1) Only trained rescuers will enter a confined space to perform a rescue.
    - (2) When utilizing an outside source to perform rescue and emergency services the following must occur:
      - (a) Permit must list the name and contact information of the provider.
      - (b) Provider must be contacted prior to the entry to confirm it is still available to respond for the duration of the entry.
      - (c) Provider must be provided an opportunity to review and accept the responsibility for responding.
      - (d) For entry into an immediate danger to life or health (IDLH) space the rescue service must be on the same site as the confined space to ensure immediate response is available.
  - d. Personnel not trained or properly equipped to perform a rescue will not be allowed to attempt a rescue.
  - e. First aid will be provided in accordance with the Company's First Aid procedures.
14. Entry procedures.

- a. When entry into a confined space is necessary, only the Competent Person or Entry Supervisor may initiate entry procedures, including the completion of a confined space entry permit. Entry into a confined space shall follow the standard entry procedure below. Prior to entry:
    - (1) Confined space entry permit shall be completed before a standard entry.
    - (2) Entry shall be allowed only when all requirements of the permit are met and it is reviewed and signed by an Entry Supervisor.
    - (3) Entry Supervisor will communicate the contents of the permit to all employees involved in the operation, and post the permit conspicuously near the work location.
    - (4) The internal atmosphere within the confined space shall be tested with a calibrated, direct-reading instrument. Employees will be given an opportunity to participate in and review calibrated air monitoring data before entry. Continuous atmospheric monitoring shall take place during the entry. Employees are entitled to request additional monitoring and a re-evaluation of the space if there is reason to believe that changes in the space have occurred. The atmosphere of the confined spaces shall be considered to be within acceptable limits when the following conditions are maintained:
      - (a) Oxygen is between 19.5 to 23.5 percent;
      - (b) Flammability is less than 10 percent of the Lower Flammable Limit (LFL); and;
      - (c) Toxicity is less than OSHA Permissible Exposure Limits (PELs).
    - (5) Emergency rescue summing procedures and information shall be included on the permit.
    - (6) Personnel shall be provided with necessary PPE as determined by the Entry Supervisor.
    - (7) Entry Supervisor will designate the authorized entrants and attendants.
    - (8) Entry Supervisor will ensure each employee has the required training to perform his/her function.
    - (9) If a hazardous atmosphere is detected during entry:
      - (a) Personnel within the confined space shall be evacuated by the Attendant(s) or Entry Supervisor until the space can be evaluated to determine how the hazardous atmosphere developed;
      - (b) Controls shall be put in place to protect employees before re-entry.
15. Multiple employer confined space entry.
- a. Entry Supervisor must ensure the following items are addressed prior to entry into a multi-employer confined space:
    - (1) Entrants have been properly trained and are aware of their specific duties in the space.
    - (2) Attendant has been properly trained is aware of his/her duties.
    - (3) Entry Supervisor has been properly trained and is aware of his/her duties.
    - (4) Permit has been properly completed and addresses all hazards.
    - (5) Rescue team (if required) is in place, available, properly equipped and trained.
    - (6) Equipment used in the confined space is serviceable and its use will not interfere or endanger entrants especially if its use requires the operator to wear PPE.
    - (7) Material or application of material does not interfere or endanger other entrants especially if the material requires the use of PPE.
    - (8) Workers involved with the entry are aware of each other's operations, the communications to be used, and how any emergency rescue will take place.
16. Entry operation reviews.

- a. Entry operations will be reviewed when there is reason to believe that the measures taken under the permit space program may not protect employees. The program will be revised to correct deficiencies found to exist before subsequent entries are authorized. Canceled permits will be reviewed within one year after each entry and the program will be revised if required to ensure that employees participating in entry operations are protected from permit space hazards.
- M. Cranes and Derricks in Construction.
  - 1. This standard applies to power-operated equipment used to hoist, lower and horizontally move a suspended load. Reference 29 CFR 1926.1400 Cranes & Derricks in Construction.
  - 2. General.
    - a. Only parts of the standard have substantive application to mechanical construction work. The primary compliance requirements that affect our workers pertain to signaling and rigging.
    - b. Key Dates.
      - (1) November 8, 2010 - Qualified Signal Person, Qualified Rigger and Most Other Provisions Effective/Enforceable.
      - (2) November 10, 2014 - Operator Certification Requirements Effective/Enforceable.
  - 3. The Company does not employ licensed crane operators or have crawler, truck, or any other type of crane in inventory except for overhead and gantry cranes. All crawler and truck type crane requirements are subcontracted to qualified crane and rigging companies.
  - 4. The Company's project managers and/or competent persons will oversee crane and rigging subcontractors to ensure they are in compliance with this section.
  - 5. Competent Persons will ensure the following before any crane lift is conducted on a jobsite:
    - a. Prior to Operation.
      - (1) Crane has been inspected annually by a qualified third party, passed inspection, and inspection sticker prominently displayed in crane's cab windshield or other appropriate place.
      - (2) Crane operator is properly licensed, and has successfully participated in refresher training every four years (to include the use of fire extinguishers). Copies of crane operator's license and proof of refresher training should be submitted as part of the lift plan.
      - (3) Inspection and preventative maintenance records are maintained for crane being used. Critical inspection items such as brakes, crane hooks, and ropes are documented at least monthly and records made viewable upon request.
      - (4) Crane pick plans have been developed and reviewed by a competent person to ensure crane is suitable for lift task.
      - (5) All rigging equipment to be used has been inspected by a competent person.
      - (6) Personnel attaching or detaching lifting equipment to loads or lifting loads are qualified riggers.
      - (7) Suitable outrigger pads are used where appropriate.
      - (8) Coordination and communication between crane operator and directing rigger have been established and agreed upon.
      - (9) An accessible fire extinguisher of 5BC rating, or higher, is available at all operator stations or cabs of equipment.
      - (10) Crane is on firm, level ground. Use mats whenever necessary, especially when lifting extremely heavy loads.
  - 6. **Highlights of this section affecting mechanical construction firms.**
    - a. **Signal Person Requirements.**
      - (1) A signal person must be provided when:
        - (a) The point of operation is not in full view of the operator;
        - (b) The view in the direction of travel is obstructed during equipment travel; and/or
        - (c) Site-specific safety concerns are an issue because the operator or the person handling the load determines that a signal person is needed.

- (2) Signal persons have to meet the following qualification requirements:
  - (a) Obtain documentation from a third-party qualified evaluator showing that the signal person meets the qualification requirements established in the standard; or
  - (b) Obtain documentation from the employer's qualified evaluator (not a third party) showing that the signal person meets the qualification requirements established in the standard.
- b. **Rigging Requirements.**
  - (1) Hoisting routes that minimize worker exposure must be used.
  - (2) No worker can be within the fall zone while the operator is not moving a suspended load, except for the following situations:
    - (a) Workers engaged in hooking, unhooking or guiding a load;
    - (b) Workers engaged in the initial attachment of the load to a component or structure; or
    - (c) Workers operating a concrete hopper or concrete bucket.
  - (3) When affected workers must in the fall zone the following criteria must be met:
    - (a) The materials being hoisted must be rigged to prevent unintentional displacement.
    - (b) Hooks with self-closing latches or their equivalent must be used.
    - (c) The rigging must be done by a **Qualified Rigger**.
      - (i) A qualified rigger is a rigger who has a recognized degree, certificate or professional standing, or extensive knowledge, training and experience, and can successfully demonstrated the ability to solve/resolve problems relating to applicable rigging applications.
    - (d) Only workers receiving the load can be within the fall zone when the load is being landed.
    - (e) During tilt up or tilt down operations the following criteria apply:
      - (i) No worker may be directly under the load.
      - (ii) Only workers essential to the operation can be in the fall zone, but may not be directly under the load.
- c. **Training Requirements.**
  - (1) Affected employers have to provide the appropriate training for signal persons and riggers at no cost to them.
- d. **Equipment Exemptions.**
  - (1) Certain types of equipment are exempt from the standard. For example, backhoes are exempt even when they're fitted with rigging equipment to lift and suspend loads. Be sure to read through the application section in this bulletin and the exemptions section in the standard to become familiar with the exemptions.
  - (2) When the company uses a light duty crane or derrick with a rated hoisting capacity of 2,000 pounds or less, much of the standard does not apply. For example, workers in the fall zone do not have to be **Qualified Riggers**. Be sure to read the detailed section in this bulletin that covers this equipment and the corresponding section in the standard to become familiar with the exemptions.
- 7. Exclusions from this standard that may apply to mechanical construction work include:
  - a. Certain types of machinery that have been modified for non-hoisting/lifting use;
  - b. Power shovels, excavators, wheel loaders, backhoes, loader backhoes and track loaders, including when this equipment is fitted with slings, chains or other rigging equipment to lift suspended loads;
  - c. Machinery originally designed as vehicle-mounted aerial devices for lifting personnel and self-propelled elevating work platforms;
  - d. Forklifts (Except that forklifts are not excluded from the standard when they are rigged to hoist and lower by way of a winch or a hook and horizontally move a suspended load);
  - e. Roustabouts;

- f. Helicopter cranes;
  - g. Articulating knuckle-boom cranes used to deliver materials to a construction site when used to transfer materials from the truck crane to the ground, without arranging the materials in a particular sequence for hoisting.
  - h. Articulating knuckle-boom cranes used to deliver materials to a construction site when the crane is used to transfer building supply sheet goods or building supply packaged materials from the truck crane onto a structure using a fork/cradle at the end of the boom, but only when the truck crane is equipped with a properly functioning automatic overload prevention device. This type of crane is not excluded from the standard when
    - (1) It is used to support or stabilize the material to facilitate a construction activity;
    - (2) The material being handled is a prefabricated component; or
    - (3) The material being handled is a structural steel member.
8. **Definitions applicable to this section.**
- a. **Competent Person** - One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to workers and who has authorization to take prompt corrective measures to eliminate them.
  - b. **Controlling Entity** - An employer that is a prime contractor, general contractor, construction manager or any other legal entity which has the overall responsibility for the construction of the project-its planning, quality and completion.
  - c. **Free Fall** - Only the brake is used to regulate the descent of the load line (the drive mechanism is not used to drive the load down faster or retard its lowering).
  - d. **Luffing Jib Limiting Device** - A device similar to a boom hoist limiting device, except that it limits the movement of the luffing jib.
  - e. **Qualified Evaluator - (Not a Third Party)** - A person employed by the signal person's employer who has demonstrated that he/she is competent in accurately assessing whether individuals meet the **Qualification Requirements** as established in the standard for a signal person.
  - f. **Qualified Evaluator - (Third Party)** - An entity that due to its independence and expertise has demonstrated that it is competent in accurately assessing whether individuals meet the **Qualification Requirements** as established in the standard for a signal person.
  - g. **Qualified Person** - One who, by possession of a recognized degree, certificate or professional standing, or who by extensive knowledge, training and experience successfully demonstrated the ability to solve/resolve problems relating to the subject matter, the work or the project.
  - h. **Qualified Rigger** - A rigger who meets the criteria for a Qualified Person.
9. **Ground Conditions.**
- a. The controlling entity must ensure that appropriate ground preparations are provided.
  - b. Where there is no controlling entity the employer must ensure that appropriate ground preparations are provided.
10. **Assembly/Disassembly.**
- a. Selection of Manufacturer or Employer Procedures.
    - (1) When assembling or disassembling equipment (or attachments), the employer must comply with all applicable manufacturer prohibitions and must comply with either the manufacturer's procedures for assembly and disassembly, or the employer's procedures, when adequate, for assembly or disassembly.
  - b. General Requirements.
    - (1) Assembly/disassembly must be directed by a person who meets the criteria for both a competent person and a qualified person, or by a competent person who is assisted by one or more qualified persons.
11. **Power Line Safety.**
- a. Assembly/disassembly (Up to 350 kV).
    - (1) If any part of the equipment will get closer than 20 feet to a power line during assembly or disassembly, the employer must ensure that:
      - (a) The power line is de-energized and visibly grounded at the worksite;

- (b) No part of the equipment gets closer than 20 feet to the power line; or
  - (c) A table in the standard is used to determine the minimum safe distance based on the line's voltage.
- b. Equipment Operations (Up to 350 kV).
  - (1) Before beginning equipment operations the employer must identify the work zone.
  - (2) If during the operations any part of the equipment will get closer than 20 feet to a power line, the employer must ensure that:
    - (a) The power line is de-energized and visibly grounded at the worksite;
    - (b) No part of the equipment gets closer than 20 feet to the power line; or
    - (c) A table in the standard is used to determine the minimum safe distance based on the line's voltage.
- c. Power Line Safety Over 350 kV.
  - (1) **For power lines over 350kV up to 1,000 kV** - If during the assembly, disassembly or operations any part of the equipment will get closer than 20 feet to a power line, the employer must ensure that:
    - (a) The power line is de-energized and visibly grounded at the worksite;
    - (b) No part of the equipment gets closer than 50 feet to the power line; or
    - (c) A table in the standard is used to determine the minimum safe distance based on the line's voltage.
  - (2) **For power lines over 1,000 kV** - The minimum clearance distance must be established by the utility owner/operator or a registered professional engineer who is a qualified person with respect to electrical power transmission and distribution.
- d. Power Line Safety - While Traveling Under or Near Power lines With No Load.
  - (1) The employer must ensure that the boom, mast and boom mast support system are lowered sufficiently to meet specified clearances established in the standard.

## 12. Inspections.

- a. **Modified Equipment** - Modified equipment must be inspected by a qualified person after the modifications have been completed, but prior to initial use.
- b. **Repaired and Adjusted Equipment** - Repaired and adjusted equipment must be inspected by a qualified person after the repairs or adjustments have been completed, but prior to initial use.
- c. **Post Assembly** - Upon completion of assembly, the equipment must be inspected by a qualified person to assure that it is configured in accordance with manufacturer equipment criteria.
- d. **Each Shift** - A competent person must begin a visual inspection prior to each shift the equipment will be used, which must be completed before or during that shift.
- e. **Monthly** - Each month that the equipment is in service it must be inspected in accordance with the criteria established in the standard.
- f. **Annual Comprehensive** - At least every 12 months the equipment must be inspected by a qualified person in accordance with the criteria established in the standard.
- g. **Severe Service** - When the equipment is used enough that there is a reasonable possibility of damage or excessive wear the employer must stop using the equipment and have it inspected by a qualified person using the inspection criteria established in the standard.
- h. **Equipment Not in Regular Use** - Equipment that has been idle for 3 months or more must be inspected by a qualified person using the inspection criteria established in the standard.

## 13. Wire Rope.

- a. Inspection.
  - (1) **Shift Inspection** - A competent person must begin a visual inspection prior to each shift the equipment will be used, which must be completed before or during that shift.
  - (2) **Monthly Inspection** - Each month an inspection must be conducted in accordance with the criteria established in the standard.

- (3) Annual Comprehensive - At least every 12 months, wire ropes in use on equipment must be inspected by a qualified person in accordance with the criteria established in the standard.
  - b. Selection and Installation Criteria.
    - (1) Original Equipment Wire Rope - Original equipment wire rope must be selected and installed in accordance with the requirements established in the standard.
    - (2) Replacement Wire Rope - Selection of replacement wire rope must be in accordance with the recommendations of the wire rope manufacturer, the equipment manufacturer, or a qualified person.
14. **Safety Devices.**
  - a. The following safety devices are required on all equipment unless otherwise specified in parts of the standard:
    - (1) Crane Level Indicator;
    - (2) *Boom Stops* (except for derricks and hydraulic booms);
    - (3) *Jib Stops* (if jib is attached);
    - (4) *Locks* on Equipment with Foot Pedal Brakes;
    - (5) *Integral Holding Device/Check Valves* on hydraulic outrigger jacks and hydraulic stabilizer jacks;
    - (6) *Rail Clamps* and *Rail Stops* on equipment on rails (except for portal cranes); and
    - (7) *Horn*.
15. **Operational Aids.**
  - a. The following operational aids are required on all equipment unless otherwise specified in parts of the standard.
    - (1) Category I Operational Aids.
      - (a) Boom Hoist Limiting Devices.
      - (b) Luffing Jib Limiting Devices.
    - (2) Category II Operational Aids.
      - (a) Boom Angle or Radius Indicator;
      - (b) Jib Angle Indicator;
      - (c) Boom Length Indicator; and
      - (d) Load Weighing and Similar Devices.
16. **Operations.**
  - a. The employer must comply with all manufacturer procedures applicable to the operational functions of equipment, including its use with attachments.
17. **Authority to Stop Operation.**
  - a. Whenever there is a concern about safety, the operator must have the authority to stop and refuse to handle loads until a qualified person has determined that the safety concern has been resolved.
18. **Signals - General Requirements.**
  - a. A signal person must be provided in each of the following situations:
    - (1) When the point of operation is not in full view of the operator;
    - (2) When the view in the direction of travel is obstructed when the equipment is traveling; and/or
    - (3) When site specific safety concerns are an issue because either the operator or the person handling the load determines that it is necessary.
  - b. **Types of Signals** - Signals to operators must be by hand, voice, audible, or new signals.
    - (1) **Hand Signals** - When using hand signals, the Standard Method must be used in most applications. Non-standard hand signals can be used when the Standard Method is not feasible or where an operation or an attachment is not covered in the Standard Method.
    - (2) **Non-Standard Hand Signals** - When using non-standard hand signals, the signal person, operator, and lift director (where there is one) must contact each other prior to the operation and agree on the non-standard hand signals that will be used.

- (3) **New Signals** - signals other than hand, voice, or audible signals may be used where the employer demonstrates that:
        - (a) The new signal provides at least equally effective communication as voice, audible, or Standard Method hand signals, or
        - (b) The new signals comply with a national consensus standard that provides at least equally effective communication as voice, audible signal or Standard Method hand signals.
  - c. **Suitability** - The signals used and means of transmitting them must be appropriate for the site conditions.
  - d. **During Operations** - During the operations the ability to transmit signals must be maintained. If that ability is interrupted the operator must safely stop all operations until the ability to transmit is re-established and a proper signal is given and understood.
  - e. **Safety Problems** - If the operator becomes aware of a safety problem and needs to communicate with the signal person, the operator must safely stop all operations. The operations must not resume until the operator and signal person agree that the problem has been resolved.
  - f. **Only One Signaler** - Only one person may give signals to a crane or derrick at a time, except for those giving the emergency stop signal.
  - g. **Safety Problems Alert** - *Anyone who becomes aware of a safety problem must alert the operator or signal person by giving the stop or emergency stop signal.*
  - h. **Directions Given to the Operator** - All directions given to the operator by the signal person must be given from the operator's direction perspective.
  - i. **Communication with Multiple Cranes/Derricks** - Where a signal person is in communication with more than one crane/derrick, a system must be used for identifying the crane/derrick each signal is for as follows:
    - (1) For each signal, prior to giving the function/direction, the signal person must identify the crane/derrick the signal is for, or
    - (2) Must use an equally effective method of identifying which crane/derrick the signal is for.
19. **Signals - Radio, Telephone or Other Electronic Transmission Signals.**
- a. **Testing Signal Transmission Devices** - The devices used to transmit signals must be tested on site before beginning operations to ensure that the signal transmission is effective, clear, and reliable.
  - b. **Dedicated Channels** - Signal transmission must be through a dedicated channel, except:
    - (1) Multiple cranes/derricks or more than one signal person may share a dedicated channel for the purpose of coordinating operations; and
    - (2) Where a crane is being operated on or adjacent to railroad tracks, and the actions of the crane operator need to be coordinated with the movement of other equipment or trains on the same/or adjacent tracks.
  - c. **Hands Free Systems** - The operator's reception of signals must be by a hands-free system.
20. **Signals - Voice Signals - Additional Requirements.**
- a. **Voice Signal Communications** - Before beginning operations, the operator, signal person and lift director (if there is one), must contact each other and agree on the voice signals that will be used. Once the voice signals are agreed upon, these workers need not meet again to discuss voice signals unless another worker is added or substituted, there is confusion about the voice signals, or a voice signal is to be changed.
  - b. **Voice Signal Elements** - Each voice signal must contain the following three elements, given in the following order.
    - (1) Function (such as hoist, boom, etc.) Direction;
    - (2) Distance and/or Speed; and
    - (3) Function, Stop Command.
  - c. **Language** - The operator, signal person and lift director (if there is one), must be able to effectively communicate in the language used.
21. **Signals - Hand Signal Chart.**

- a. **Charts** - Hand signal charts must be either posted on the equipment or conspicuously posted in the vicinity of the hoisting operations.
22. **Fall Protection.**
- a. **Fall Prevention/Protection** - Fall prevention and/or protection must be provided as established in the parts of the standard.
23. **Work Area Control.**
- a. **Swing Radius Hazards** - Workers must be protected from reasonably foreseeable risks of being struck by and/or pinched or crushed by the equipment's rotating superstructure.
  - b. **Training** - Affected workers must be trained to recognize struck by and pinch/crush hazard areas posed by the rotating superstructure.
  - c. **Barriers** - Control lines, warning lines, railings or similar barriers must be erected to mark the boundaries of the hazardous areas, unless it is infeasible to do so. Where it is infeasible to erect barricades, the hazard area must be marked by a combination of warning signs (such as "Danger-Swing/Crush Zone") and high visibility markings on the equipment that identify the hazard areas. Employers must train affected workers what these markings signify.
  - d. **Protecting Workers in the Hazard Area**- Before a worker goes to a location in the hazard area that is out of the view of the operator, the worker (or someone instructed by the worker) must ensure that the operator is informed that he/she is going to that location.
24. **Keeping Clear of the Load.**
- a. **Hoisting Routes** - Where available, hoisting routes that minimize the exposure of workers to hoisted loads must be used.
  - b. **Workers in Fall Zone** - While the operator is not moving a suspended load, no worker must be within the fall zone except for the following:
    - (1) Workers engaged in hooking, unhooking or guiding a load;
    - (2) Workers engaged in the initial attachment of the load to a component or structure;
    - or
    - (3) Workers operating a concrete hopper or concrete bucket.
  - c. **Safety Criteria for Workers in Fall Zone** - When affected workers must be in the fall zone the following criteria must be met:
    - (1) The materials being hoisted must be rigged to prevent unintentional displacement.
    - (2) Hooks with self-closing latches or their equivalent must be used.
    - (3) The rigging must be done by a qualified rigger.
  - d. **Safety Criteria for Receiving a Load** - Only workers receiving the load can be within the fall zone when the load is being landed.
  - e. **Safety Criteria for Tilt Up or Tilt Down Operations** - During tilt up or tilt down operations the following criteria apply:
    - (1) No worker may be directly under the load.
    - (2) Only workers essential to the operation can be in the fall zone, but may not be directly under the load.
  - f. **Workers Essential to the Operation** - Workers are essential to the operation only if the following apply:
    - (1) It is infeasible for the worker to perform the operation from outside the fall zone and;
    - (2) The worker is physically guiding the load; or
    - (3) The worker is closely monitoring and giving instructions regarding the loads movement; or
    - (4) The worker must detach the load or initially attach the load to another component or structure.
25. **Free Fall and Controlled Load Lowering.**
- a. **Boom Free Fall Prohibitions** - Equipment in which the boom is designed to free fall is prohibited when:
    - (1) A worker is in the fall zone of the boom or load;
    - (2) A worker is being hoisted;

- (3) The load or boom is directly over a power line or other areas established in the standard;
  - (4) The load is over a shaft where workers are present in the shaft;
  - (5) The load is over a cofferdam where workers are present in the cofferdam; or
  - (6) Lifting operations are taking place in a refinery or a tank farm.
- b. **Preventing Boom Free Fall** - Where the use of equipment with a boom that is designed to free fall is prohibited, the boom hoist must have a secondary mechanism or device designed to prevent the boom from falling in case the primary system fails.
  - c. **Preventing Uncontrolled Retraction** - Hydraulic telescoping booms must have an integrally mounted holding device to prevent the boom from retracting in the event of hydraulic failure.
  - d. **Load Line Free Fall** - When a worker is directly under the load, being hoisted or when the load is directly over a power line or any other area established in the standard, controlled load lowering is required and free fall of the load line is prohibited.
- 26. Operator Qualification and Certification**
- a. **Qualification or Certification** - The employer must ensure that the operator is qualified or certified in accordance with the standard. Employer options for getting affected operators qualified or certified follow:
    - (1) Certification by an accredited crane operator testing organization;
    - (2) Qualification by an audited employer program;
    - (3) Qualification by the U.S. military; or
    - (4) Licensing by a government entity.
  - b. **Exceptions to Qualification and Certification Requirements.**
    - (1) Operators of derricks, sideboom cranes, or equipment with a maximum manufacturer-rated hoisting/lifting capacity of 2,000 pounds or less are excepted from qualification and certification requirements.
  - c. **Qualification/Certification Dates** - Operators must become *qualified* or *certified* as established in the standard by November 10, 2014.
- 27. Signal Person Qualifications.**
- a. **Qualification Requirements** - The employer must ensure that signal persons meet the following qualification requirements before giving any signals to operators:
    - (1) Obtain documentation from a third party qualified evaluator showing that the signal person meets the qualification requirements established in the standard; or
    - (2) Obtain documentation from the employer's qualified evaluator (not a third party) showing that the signal person meets the qualification requirements established in the standard.
  - b. **Portability of Qualification** - Third party qualification is portable from one employer to another. However, employer qualified evaluator qualification is not portable.
  - c. **Documentation Availability** - The employer must make signaler qualification documentation available at the site where the signal person is employed.
  - d. **Types of Signaling** - The documentation must specify each type of signaling the signal person is qualified to perform such as hand signals, radio signals, etc.
  - e. **Qualification Requirements** - Each signal person must demonstrate the following:
    - (1) Knowledge and understanding of the type of signals used. If hand signals are used, the signal person must know and understand the Standard Method for hand signals;
    - (2) Competence in the application of the types of signals used;
    - (3) Basic understanding of the equipment operation and limitations, including the crane dynamics involved in swinging and stopping loads and boom deflection from hoisting loads;
    - (4) Knowledge and understanding of the relevant requirements of the standard covered in the sections on *Signals-General Requirements, Signals - Hand Signal Chart, and Signal Person Qualifications; and*

- (5) That he or she meets the qualification requirements through successful completion of an oral or written test and a practical test.
- f. **Unmet Qualification Requirements.**
  - (1) Where actions by the signal person indicate that the individual does not meet the qualification requirements, the employer must not allow the individual to work as a signal person until re-training is provided and a reassessment is completed in accordance with the qualification requirements.
- 28. **Qualifications of Maintenance & Repair Employees.**
  - a. **Maintenance, Inspection and Repairs** - Maintenance, inspection and repair personnel are permitted to operate the equipment only where specified requirements are met as established in the standard.
- 29. **Training.**
  - a. **Training Requirements** - Affected employers must provide training for the following subjects:
    - (1) Overhead Power lines;
    - (2) Signal Persons;
    - (3) Operators;
    - (4) Competent Persons;
    - (5) Qualified Persons;
    - (6) Crush/Pinch Points; and
    - (7) Tag-out.
  - b. **Training Administration** - The employer must evaluate each worker who requires training to confirm that he or she understands the information provided in the training.
  - c. **Refresher Training** - The employer must provide refresher training in relevant topics for each worker when there is indication that retraining is necessary.
  - d. **Training Cost to Workers** - The employer must provide the training at no cost to the workers.
- 30. **Hoisting Personnel.**
  - a. **Personnel Hoisting Requirements** - The use of equipment to hoist personnel is prohibited unless the employer can demonstrate that other methods would be more hazardous and is able to comply with the personnel hoisting requirements that are established in the standard.
- 31. **Multiple-Crane/Derrick Lifts-Supplemental Requirements.**
  - a. **Planning** - When more than one crane or derrick is to be used to support the load the operation must be planned in accordance with the requirements established in the standard.
- 32. **Design Construction and Testing.**
  - a. **Equipment Design, Construction and Testing Requirements** - Each type of equipment that has a manufacturer-rated hoisting/lifting capacity of more than 2,000 pounds must meet the design, construction and requirements established in the standard. These requirements refer to existing ANSI or ASME standards depending on the type of equipment.
- 33. **Tower Cranes.**
  - a. **Supplemental Tower Crane Requirements** - Employers using tower cranes must comply with specific provisions in the standard that cover the following subjects:
    - (1) Erecting, Climbing and Dismantling;
    - (2) Signs;
    - (3) Safety Devices;
    - (4) Operational Aids; and
    - (5) Inspections
- 34. **Derricks.**
  - a. **Supplemental Derrick Requirements** - Employers using derricks must comply with specific provisions in the standard that cover the following subjects:
    - (1) Operation - Procedures;
    - (2) Construction;
    - (3) Anchoring and Guying;

- (4) Swingers and Hoists;
  - (5) Operational Aids;
  - (6) Post-Assembly Approval and Testing - New or Reinstalled Derricks;
  - (7) Load Testing Repaired or Modified Derricks;
  - (8) Power Failure Procedures;
  - (9) Use of Winch Heads;
  - (10) Securing the Boom;
  - (11) Process of Jumping the Derrick;
  - (12) Derrick Operation Supervision;
  - (13) Inspections;
  - (14) Qualification and Training of Derrick Operators.
- 35. Floating Cranes/Derricks and Land Cranes/Derricks on Barges.**
- a. **Requirements** - Employers using this equipment must comply with specific provisions in the standard that cover the following subjects:
    - (1) General Requirements;
    - (2) Work Area Control;
    - (3) Keeping Clear of the Load;
    - (4) Additional Safety Devices;
    - (5) Operational Aids;
    - (6) Accessibility of Procedures Applicable to Equipment Operation;
    - (7) Inspections;
    - (8) Working with a Diver;
    - (9) Manufacturer's Specifications and Limitations;
    - (10) Floating Cranes and Derricks; and
    - (11) Land Cranes and Derricks.
- 36. Overhead and Gantry Cranes.**
- a. Overhead and Gantry Cranes Used in Construction Regardless of Whether they are Permanently Installed must comply with specified provisions of the standard.
- 37. Dedicated Pile Drives.**
- a. Dedicated Pile Drivers must comply with most provisions in the standard, but are excepted from several provisions as established in the standard.
- 38. Side boom Cranes.**
- a. Sideboom Cranes must comply with most provisions in the standard, but are excepted from several provisions as established in the standard.
- 39. Equipment with a Rated Hoisting/Lifting Capacity of 2,000 Pounds or Less.**
- a. Compliance Requirements for Employers Using Equipment with a Rated **Hoisting/Lifting Capacity of 2,000 Pounds or Less.** Employers using this equipment must comply with the following provisions as established in the standard:
    - (1) Scope;
    - (2) Ground Conditions;
    - (3) Assembly/Disassembly - Selection of Manufacturer or Employer Procedures;
    - (4) Assembly/Disassembly - Employer Procedures;
    - (5) Power Line Safety;
    - (6) Post Assembly;
    - (7) Wire Rope;
    - (8) Authority to Stop Operations;
    - (9) Signals;
    - (10) Fall Protection;
    - (11) Keeping Clear of Load (Except for the Qualified Rigger Requirement);
    - (12) Free Fall and Controlled Load Lowering;
    - (13) Multiple Crane/Derricks Lifts - Supplemental Requirements;
    - (14) Equipment Modifications;
    - (15) Tower Cranes;
    - (16) Floating Cranes/Derricks and Land Cranes/Derricks on Barges; and

(17) Overhead Gantry Cranes.

b. **Assembly/Disassembly.** Employers using this equipment must also comply with the following:

- (1) Ensure that the selection of components, and the configuration of the equipment that affects the capacity or safe operation of the equipment, complies with the manufacturer's instructions, recommendations limitations and specifications; or
- (2) Meet the requirements established in the standard covering *Equipment Modifications*. With this option, the employer must also ensure that the equipment is inspected upon completion of assembly and in compliance with the selection of components and configuration of equipment requirements that affect the capacity or safe operation of the equipment.
- (3) **Manufacturer Prohibitions** - Employers using this equipment must comply with applicable manufacturer prohibitions.
- (4) **Operation - Procedures** - Employers using this equipment must comply with all manufacturer procedures applicable to the operational functions of the equipment, including its use with attachments.
- (5) **Unavailable Operation Procedures** - When the manufacturer's procedures are unavailable employers using this equipment must comply with the following requirements:
  - (a) Develop and implement compliance with all procedures necessary for the safe operation of the equipment and attachments;
  - (b) Ensure that procedures for the operational controls are developed by a qualified person; and
  - (c) Ensure that procedures related to the capacity of the equipment are developed and signed by a registered professional engineer familiar with the equipment.
- (6) **Accessibility** - Employers using this equipment must comply with the following accessibility requirements.
  - (a) The load chart must be available to the operator at the control station;
  - (b) Procedures applicable to the operation of the equipment, recommended operating speeds, special hazard warnings, instructions, and operator's manual are readily accessible for use by the operator;
  - (c) When the rated capacities are available at the control station only in electronic form and a failure occurs that makes the rated capacities inaccessible, the operator must immediately cease operations or follow safe shut-down procedures until the rated capacities become available.
- (7) **Safety Devices and Operational Aids** - Employers using this equipment must comply with the following safety device and operational aid requirements.
  - (a) Ensure that safety devices and operational aids that are part of the original equipment are maintained in accordance with manufacturer procedures;
  - (b) Ensure that the equipment manufactured more than one year after November 8, 2010 have either an anti two-block device that meets the requirements for anti two-blocking devices found in the *Operation* section of the standard, or is designed so that no damage or load failure will occur.
- (8) **Operator Qualifications** - Employers using this equipment must comply with the following operator qualifications requirements.
  - (a) Train each operator before they are allowed to operate the equipment on the safe operation of the type of equipment that he or she will be using;
  - (b) Train each signal person in the proper use of signals applicable to the equipment that he or she will be using;
  - (c) Ensure that equipment is inspected in accordance with manufacturer procedures;
  - (d) Ensure that the equipment is not used to hoist personnel; and
  - (e) Ensure that the equipment is designed by a qualified engineer.

N. Damaged equipment.

1. Damaged equipment is any equipment that is damaged to the extent it could cause worker injury or property damage.
2. General.
  - a. Carefully inspect all equipment before each use.
  - b. If you do not see damage, test the equipment to determine whether it is functioning properly.
  - c. If you do see damage, identify it as unsafe to use by locking to use by locking or tagging out the controls, or by tagging and physically removing the equipment from the jobsite.

O. Disposal Chutes.

1. Disposal chutes are inclined channels or passages for disposing of scrap material from upper levels of buildings that are under construction, renovation or demolition. The bottom of the chute is usually positioned directly above a waste dumpster.
2. General.
  - a. Use a disposal chute any time you are dropping materials more than 20 feet to a point outside a building.
  - b. Barricade the area underneath floor openings that are not equipped with chutes whenever you have to drop materials through the openings to a lower level.
  - c. Barricades should be at least 6 feet from the edges of the opening *above* and at least 42 inches high.
  - d. Post signs warning others about the overhead falling materials.

P. Electrical - Safe Work Practices – **Non-Electricians**.

1. General.
  - a. Electrical safe work practices are procedures established to protect workers from electrical shock and arc flash hazards when working with or near sources of electricity, or tools and equipment powered by electricity.
  - b. Only qualified electricians shall perform work on electrical equipment, systems, or circuits.
  - c. A Competent Person shall ensure that all Employees potentially exposed to electrical hazards possess the knowledge and skill required to perform the duties for which they are assigned.
2. Before Starting Work.
  - a. Use a ground fault circuit interrupter (GFCI) for all 120-volt, single phase, 15- and 20-amp receptacle outlets that are not part of the permanent wiring of the building or structure.
  - b. When using double insulated tools or appliances in place of grounded tools or appliances, make sure they are clearly marked as double insulated. Look for the words "Double Insulated" or the double insulation symbol, which is a small square inside a larger square.
  - c. Verify that the extension cord you will be using is rated to accept the maximum current (amps) pulled by the portable power tool you will be operating. Inspect the cord for cuts, frays, exposed conductor wires, and ground pins. If the cord passes inspection place the appropriate colored tape on both ends. If the cord fails inspection immediately red-tag it and take it out of service.

Quarterly Color Code for Inspection:

January – March = White

April – June = Green

July – September = Red

October – December = Orange

- d. Carefully inspect all tool and equipment cords, extension cords and plugs for damage and excessive wear such as broken, cut, frayed or abraded insulation, broken or exposed wires, and missing ground terminals.
- e. When you come across damaged electrical cords, tools or equipment, immediately follow the Company's procedure for taking defective equipment out of service.
- f. Never attempt to repair a damaged cord with electrical tape or any other materials.
- g. Make sure that portable lights in wet or otherwise conductive locations such as tanks or boilers are protected by a GFCI, or make sure they are pulling no more than 12 volts.

- h. Do not suspend temporary lights by their cords unless they are designed specifically for that purpose.
- 3. While Working.
  - a. Protect extension cords and tool and equipment cords from damage due to vehicle traffic, sharp building materials, pinch points such as doorways, and other potential sources of damage.
  - b. Never attach extension cords to objects with staples, hang them from nails, or suspend them from wire.
  - c. Wear properly rated insulated gloves when operating jackhammers, digging bars or other conductive tools in areas where underground power lines could be present.
  - d. Work slowly and cautiously to avoid damaging the insulation on buried electrical wire.
  - e. When you have to work near electrical circuits where contact with exposed live parts is possible, ensure that the source of electricity has been de-energized and locked out by someone who is qualified to do it safely.

Q. Electrical - Safe Work Practices – **Qualified Electricians Only.**

1. General.

- a. Electrical safe work practices are procedures established to protect workers from electrical shock and arc flash hazards when working with or near sources of electricity, or tools and equipment powered by electricity.
- b. Only qualified electricians shall perform work on electrical equipment, systems, or circuits.
- c. All electrical work and practices shall comply with OSHA29CFR Part 1926.400 through 1926.449, NFPA 70 - National Electrical Code, NFPA 70E - Standard for Electrical Safety in the Workplace, and state Electrical Code. Where codes/regulations/requirements conflict, the more stringent guideline shall apply.
- d. A Competent Person shall ensure that all Employees potentially exposed to electrical hazards possess the knowledge and skill required to perform the duties for which they are assigned.
- e. Electrical equipment shall not be opened/serviced/repared or otherwise handled until it has been de-energized, locked and tagged out, and verified to conduct zero energy. Verification of zero energy (voltage testing/metering) is considered energized electrical work.

2. Energized Electrical Work.

- a. Where work on energized systems is required and necessary, the requirements outlined in **Section 10 - Energized Electrical Work** shall be adhered to. NOTE: It is assumed that it is feasible and practical to isolate, lock, and tag all hazardous energy sources, except those instances where continuity of service is essential to life and health, or where testing of circuits must be performed in the energized state. When Circuits with Exposed Live Parts Can't Be De-energized and Locked-Out:
  - (1) Meet with your supervisor to plan all safety procedures before, during and after the job.
  - (2) Make sure you are properly trained before starting work.
  - (3) Always wear the appropriate personal protective equipment when working near exposed live parts.
    - (a) 480 volts or less, wear:
      - (i) 4-8 calorie flame-resistant long-sleeved shirt and pants
      - (ii) Safety glasses
      - (iii) Class E hard hat
      - (iv) 8 calorie arc flash face shield
      - (v) Class 00 rubber insulated gloves
      - (vi) Protective leather gloves over the rubber gloves
      - (vii) Earplugs
    - (b) When potential exposure is from circuits pushing more than 480 volts, more extensive training and more sophisticated protective measures and protective equipment are necessary. Do not proceed without the proper additional training and authorization from your supervisor.

3. Cable tuggers/pullers/winches.

- a. All cable tuggers/pullers/winches must be accompanied by the user's manual. Operators must have read and understand the manufacturer's requirements outlined in the user's manual.
  - b. Only persons specifically trained and qualified shall operate cable tuggers/pullers/winches, etc.
  - c. All rigging/ropes/chains/anchors, etc. used with cable tuggers/pullers/winches shall be rated to meet or exceed the maximum output force of the equipment being used. All equipment and rigging shall be inspected by the Competent Person prior to use. Defective or worn equipment shall be tagged as such and removed from service.
  - d. All cable tugging/pulling/winning areas shall be cordoned off using danger tape and signs, or barricades while in operation in order to minimize the potential for injury in the event of a mechanical failure/line parting.
4. Temporary (Construction Use) Power.
- a. All 125 volt 15, 20, and 30 amp temporary power receptacles should be protected by a ground fault circuit interrupter (GFCI) at the receptacle.
  - b. Receptacles other than 125 volt 15, 20, and 30 amps should be protected by a GFCI either at the breaker or the receptacle.
  - c. Permanent power receptacles used during construction shall require the use of a portable GFCI, plugged into the receptacle, or replacement with a GFCI outlet.
  - d. Portable electric power units (spider boxes) should have a GFCI at the unit receptacle, and the cord supplying power from the outlet (or panel if hard wired) shall be SO type. The maximum length of power supply cords from the outlet to the spider box should be one hundred (100) feet. Spider box power cords shall be protected from vehicular and pedestrian traffic, and shall be routed so as not to pose a tripping hazard.
  - e. Portable generators shall have GFCI protection at the receptacle.
- R. Electrical - Energized Electrical Work - **Qualified Electricians Only.**
1. Definitions.
- a. Arc rating: The maximum incident energy resistance demonstrated by a material (or a layered system of materials) prior to "breaking open" or at the onset of a second-degree skin burn. This rating is assigned to electrical protective clothing and is normally expressed in calories per square centimeter (cal/cm<sup>2</sup>).
  - b. Electrically safe work condition: A state in which the conductor or circuit part to be worked on or near has been disconnected from energized parts, locked/tagged, tested to ensure the absence of voltage, and grounded if determined necessary.
  - c. Energized: Electrically connected to or having a source of voltage.
  - d. Exposed (as applied to live parts): Capable of being inadvertently touched or approached from closer than a safe distance by a person. It is applied to parts that are not suitably guarded, isolated, or insulated.
  - e. Flash hazard analysis: A study investigating a worker's potential exposure to arc-flash energy, conducted for the purpose of injury prevention and the determination of safe work practices along with appropriate levels of PPE.
  - f. Flash protection boundary: An approach limit at a distance from exposed live parts within which a person could receive a second degree burn if an electrical arc flash were to occur.
  - g. Flash suit: A complete FR clothing and equipment system that covers the entire body, except for the hands and feet. (Such a suit typically includes pants, jacket, and a "bee-keeper" style hood fitted with a face shield).
  - h. FR apparel: Flame-resistant apparel; describes a broad category of clothing designed to protect employees from electrical arc events during completion of energized tasks.
  - i. Incident energy: The amount of energy impressed on a surface, a certain distance from the source, generated during an electrical arc event. One of the units used to measure incident energy is calories per square centimeter (cal/cm<sup>2</sup>).
  - j. Limited approach boundary: An approach limit at a distance from an exposed live part within which a shock hazard exists.
  - k. Live parts: Energized conductive components.

- l. Prohibited approach boundary: An approach limit at a distance from an exposed live part within which work is considered the same as making contact with the live part.
  - m. PPE: An acronym for "Personal Protective Equipment".
  - n. Qualified person: One who has skills and knowledge related to the construction and operation of the electrical equipment and installation and has received training on the hazards involved.
  - o. Restricted approach boundary: An approach limit at a distance from an exposed live part within which there is an increased risk of shock (due to electrical arc-over combined with inadvertent movement) for personnel working in close proximity to the live part.
  - p. Unqualified person: Any person who does not meet the definition of a qualified person.
  - q. Working near (live parts): Any activity within a Limited Approach Boundary.
  - r. Working on (live parts): Coming in contact with live parts via tools, probes, test equipment, hands, feet, or other body parts regardless of the level of PPE worn.
2. Hazard/Risk Evaluation Procedure.
- a. Before any task is performed on or near exposed live parts, the employee needs to determine whether he/she might be exposed to a safety hazard. If the employee might be exposed to a hazard, he/she should determine whether the risk of injury is significant. Annex A, Hazard/Risk Evaluation, illustrates a series of questions in the form of a flow chart that is intended to identify electrical hazards and the degree of risk. Once the hazard and degree of risk are identified, personal protective equipment (PPE) must be selected. The employee and his/her supervisor will use the degree of risk to evaluate whether the risk of injury is sufficiently low enough to accept the risk.
3. Job Briefing.
- a. General. Before starting each job associated with work on or near live parts, the employee in charge will conduct a job briefing with the employees involved. The briefing must include a discussion of electrical hazards and how employees might be exposed to them. As a minimum the following subjects will be included:
    - (1) Electrical hazards associated with the work task.
    - (2) Procedures that must be followed when executing the work task.
    - (3) Any special precautions that are required by the working conditions.
    - (4) Where and how to remove the source of energy.
    - (5) Emergency response and emergency communications.
    - (6) Required PPE.
    - (7) Other work in the immediate physical area.
    - (8) Other work associated with the same electrical circuits or equipment.
4. Repetitive or Similar Tasks. If the work task is a repetitive task that is performed several times during the day, a single job briefing held before the worker performs the task for the first time is satisfactory. If significant changes that might affect the safety of employees occur during the day, however, a new job briefing is required.
5. Routine Work. A brief discussion shall be satisfactory if the work involved is routine and if the employee, by virtue of training and experience, can reasonably be expected to recognize and avoid hazards involved in the job. A more extensive discussion shall be conducted if either of the following apply:
- a. The work is complicated or particularly hazardous.
  - b. The employee cannot be expected to recognize and avoid the hazards involved in the job.
  - c. Justification for work. Prior to working on or near exposed electrical conductors and circuits parts operating at 50 volts or more, lockout/tagout devices shall be applied unless:
  - d. De-energizing introduces additional or increased hazards. Examples of "additional or increased" hazards would include interruption of life support equipment, deactivation of emergency alarm systems, or shutdown of hazardous location ventilation systems.

- e. De-energizing is not possible due to equipment design or operational limitations. Examples of this situation would include testing and troubleshooting of electrical circuits that can only be performed with the circuit energized and work on circuits that form an integral part of a continuous process that would otherwise need to be completely shut down in order to permit work on one circuit or piece of equipment.
  - f. Live parts are operating at less than 50 volts to ground and there is no increased exposure to electrical burns or to explosion due to electrical arcs.
6. Electrical Hazard analysis.
- a. Qualified workers who are permitted to work on or near exposed energized conductors or circuit parts must select and use work practices that provide protection from shock, arc flash, and other electrical hazards. The hazard/risk analysis must determine whether any conductor will remain energized for the duration of the work task. The analysis must determine the Shock Approach Boundaries and Flash Protection Boundary.
7. Shock Hazard Analysis.
- a. A shock hazard analysis shall determine the voltage to which personnel will be exposed, boundary requirements, and the personal protective equipment necessary in order to minimize the possibility of an electric shock to personnel. Shock approach boundaries are identified as Limited, Restricted, and Prohibited. A person must be qualified before he or she can cross the Limited Approach Boundary. To cross the Restricted Approach Boundary, in addition to being a qualified person, the worker must also wear PPE for protection from shock. The Limited Approach Boundary is intended to restrict the approach of unqualified persons. The Restricted Approach Boundary is intended to restrict the approach of qualified persons not wearing proper PPE.
8. Shock Protection Boundaries.
- a. The shock protection boundaries identified as Limited, Restricted, and Prohibited Approach Boundaries are applicable when personnel approach or are exposed to live parts. **See Table 4 - Approach Boundaries to Live Parts for Shock Protection** for the distances associated with various system voltages.
9. Approaching exposed live parts.
- a. No qualified person shall approach or take any conductive object closer to exposed live parts operating at 50 volts or more than the Restricted Approach Boundary set forth in **Table 4 - Approach Boundaries to Live Parts for Shock Protection** unless any of the following apply:
  - b. The qualified person is insulated or guarded from live parts (insulating gloves or insulating gloves and sleeves are considered insulation only with regard to the energized parts upon which work is being performed), and no un-insulated part of the qualified person's body crosses the Prohibited Approach Boundary set forth in **Table 4 - Approach Boundaries to Live Parts for Shock Protection** of this section.
  - c. The live part is insulated from the qualified person and from any other conductive object at a different potential.
  - d. The qualified person is insulated from any other conductive object as during the live-line bare-hand work.
10. Restricted & Prohibited Approach Boundaries:
- a. Qualified persons may not cross or take any conductive object closer than the Restricted Approach Boundary unless one of the following conditions apply:
    - (1) The qualified person is insulated or guarded from the live parts and no un-insulated part of the qualified person's body crosses the Prohibited Approach Boundary.
    - (2) The live parts are insulated from the qualified person and from any other conductive object at a different potential.
  - b. Crossing the Prohibited Approach Boundary is considered the same as making contact with energized parts. Qualified persons may only cross this boundary when all of the following precautions have been taken:
    - (1) The qualified person has specific training to work on energized parts.
    - (2) The qualified person has obtained an approved The Company Energized Electrical Work Permit.

- (3) The qualified person uses PPE appropriate for working on energized parts which are rated for the voltage and energy level involved.
  - c. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that a clearance of 10 feet is maintained. If the voltage is higher than 50kV, the clearance shall be increased 4 inches for every 10kV over that voltage.
  - d. Approach by Unqualified Persons. Unqualified persons shall not be permitted to enter spaces that are required to be accessible to qualified employees only, unless the electric conductors and equipment involved are in an electrically safe work condition.
    - (1) Qualified person will advise unqualified person(s) of the electrical hazard and warning him/her to stay outside of the Limited Approach Boundary.
    - (2) Where there is a need for an unqualified person(s) to cross the Limited Approach Boundary, a qualified person shall advise him/her of the possible hazards and continuously escort the unqualified person(s) while inside the Limited Approach Boundary. (NOTE: Under no circumstances shall the escorted unqualified person(s) be permitted to cross the Restricted Approach Boundary).
- 11. Flash Hazard Analysis.
  - a. A flash hazard analysis shall be done in order to protect personnel from the possibility of being injured by an arc flash. The analysis will determine the distance from the potential arcing fault point that will expose a person to a second-degree burn (Flash Protection Boundary). Any body part that is closer to the potential arcing fault must be protected from the thermal effects of that fault.
- 12. Flash Protection Boundary.
  - a. For systems that are 600 volts or less, the Flash Protection Boundary shall be 4.0 feet, based on the product of clearing times of 6 cycles (0.1 second) and the available fault current of 50kA or any combination not exceeding 300kA cycles (5000ampere seconds).
- 13. Protective Clothing.
  - a. See Table 5 - Hazard/Risk Category Classifications and Table 7 – Personal Protective Clothing and Equipment Matrix to determine the required PPE.
- 14. Energized Electrical Work Permit.
  - a. Prior to working on live parts the following tasks will take place:
    - (1) An Electrical Work Permit will be completed and approved. See Energized Electrical Work Permit form of this section. (NOTE: Work related to testing, troubleshooting, and voltage measuring may be completed without a permit provided appropriate safe work practices and PPE are used).
    - (2) The permit is to be originated by the individual requesting that the energized work be completed. (This will normally be the supervisor of the employees who will be completing the work). The requestor is responsible for completing Section I of the permit.
    - (3) The qualified persons completing the task are responsible for completing Section II of the permit.
    - (4) All Energized Electrical Work Permits should be submitted through the Electrical Project Manager for final approval. The Electrical Project Manager must approve the permit prior to beginning the work. The Electrical Project Manager must hold a valid Electrical Masters License or above.
    - (5) The permit must be posted in the area where the energized work is taking place for the duration of the task.
    - (6) Copies of all energized electrical work permits must be provided to the Director of Safety upon completion of the task.
- 15. Other Precautions for Personnel Activities:
  - a. Employees shall not reach blindly into areas that might contain exposed live parts.
  - b. Employees shall not enter spaces containing live parts unless illumination is provided that allows the work to be performed safely.

- c. Conductive articles of jewelry and clothing (such as watchbands, bracelets, rings, key chains, necklaces, aprons with metal, cloth with conductive thread, metal headgear, or metal frame glasses) shall not be worn where they present an electrical contact hazard with exposed live parts.
  - d. Conductive materials, tools, and equipment that are in contact with any part of an employee's body shall be handled in a manner that prevents accidental contact with live parts. Such materials and equipment include, but are not limited to, long conductive objects such as ducts, pipes, tubes, conductive hose and rope, metal-lined rules and scales, steel tapes, pulling lines, metal scaffold parts, structural members, and chains.
  - e. When an employee works in a confined space or enclosed space (such as a manhole or vault) that contains exposed live parts, the employee shall use protective shields, barriers, or insulating materials as necessary to avoid contact with these parts. Doors, hinged panels, and the like shall be secured to prevent them from swinging into employees.
16. Personal Protective Equipment.
- a. General Requirements.
    - (1) Employees working in areas where electrical hazards are present shall be provided with, and shall use, protective equipment (Arc Flash Gear) that is designed and constructed for the specific body part to be protected and for the work to be performed.
    - (2) The company will provide electrical protective equipment (Arc Flash Gear) required by this program at no cost to employees. Such equipment shall include 11 calorie, and 40 calorie rated Arc Flash apparel (as required), eye protection, head protection, hand protection, and face shields where necessary. The Company is not responsible for providing under layers (i.e. cotton underwear or personal footwear).
    - (3) All protective equipment shall be maintained in a safe, reliable condition by the employee to whom it is issued.
    - (4) Employees shall wear nonconductive head protection whenever there is a danger of head injury from electric shock or burns due to contact with live parts or from flying objects resulting from an electrical explosion.
    - (5) Employees shall wear nonconductive protection for the face, neck, and chin whenever there is danger of injury from exposure to electric arcs or flashes or from flying objects resulting from an electrical explosion.
    - (6) Employees shall wear protective equipment for the eyes whenever there is a danger of injury from electric arcs, flashes, or from flying objects resulting from an electrical explosion.
    - (7) Employees shall wear rubber insulating gloves where there is danger of hand and arm injury due to contact with live parts or possible exposure to arc flash burn.
    - (8) Arc flash protection - Leather or FR gloves shall be worn where required for arc flash protection.
    - (9) Shock protection - Employees shall wear rubber insulating gloves where there is a danger of hand and arm injury from electric shock due to contact of live parts. Where insulating rubber gloves are worn for shock protection, leather protectors shall be worn over the rubber gloves.
    - (10) Class O or class OO gloves without leather protectors shall be used ONLY for making fine adjustments, taking measurements, or performing other similar intricate work.
    - (11) Where insulated footwear is used as protection against step and touch potential, dielectric overshoes shall be required. Insulated soles shall not be used as primary electrical protection.
    - (12) Face shields without an arc rating will not be used for electrical work. Safety glasses or goggles must always be worn underneath face shields.
    - (13) Additional illumination may be needed when using tinted face shields as protection during electrical work.
  - b. Flash Protection Boundary.

- (1) Personal protective equipment shall be provided to and used by all employees working within the "Flash Protection Boundary".
  - (2) For systems that are 600 volts or less, the Flash Protection Boundary shall be a minimum of four feet. The formula in Appendix D – Formula for Calculation of Flash Protection Boundary can be used to determine the exact Flash Protection Boundary for systems under 600 volts.
  - (3) For systems that are above 600 volts, the Flash Protection Boundary shall be determined through engineering analysis.
  - (4) The specific protective equipment to be worn within the Flash Protection Boundary can be determined by either of the following two methods:
  - (5) Complete a detailed flash hazard analysis under engineering supervision that determines the incident exposure energy of each employee. Appropriate protective clothing can then be selected based on the calculated exposure level.
  - (6) Determine the hazard level of the task by referring to Appendix E – Hazard/Risk Category Classification. This table also indicates whether voltage-rated gloves and/or voltage-rated tools need to be used. Once the hazard level of the task has been determined, the required PPE can then be ascertained from Appendix F – Personal Protective Equipment Matrix.
- c. Flame-Resistant Apparel & Under-Layers.
- (1) FR apparel shall be visually inspected before each use. FR apparel that is contaminated or damaged shall not be used. Protective items that become contaminated with grease, oil, flammable liquids, or combustible liquids shall not be used.
  - (2) The garment manufacturer's instructions for care and maintenance of FR apparel shall be followed.
  - (3) When FR apparel is worn to protect an employee, it shall cover all ignitable clothing and allow for movement and visibility.
  - (4) FR apparel must cover potentially exposed areas as completely as possible. FR shirt sleeves must be fastened and FR shirts/jackets must be closed at the neck.
  - (5) Non-melting, flammable garments (i.e. cotton, wool, rayon, silk, or blends of these materials) may be used as under-layers beneath FR apparel.
  - (6) Fibers that can melt such as acetate, nylon, polyester, polypropylene, and spandex shall not be permitted in fabric under-layers next to the skin. (An incidental amount of elastic used on non-melting fabric underwear or socks shall be permitted).
  - (7) FR garments worn as outer layers over FR apparel (i.e. jackets or rainwear) must also be made from FR material.
  - (8) Flash suits must permit easy and rapid removal by the user.
- d. Rubber Insulating Equipment.
- (1) Rubber insulating equipment includes protective devices such as gloves, sleeves, blankets, and matting.
  - (2) Insulating equipment must be inspected for damage before each day's use and immediately following any incident that could have caused damage.
  - (3) An air test must be performed on rubber insulating gloves before each use.
  - (4) Insulating equipment found to have defects that might affect its insulating properties must be removed from service until testing indicates that it is acceptable for continued use.
  - (5) Where the insulating capability of protective equipment is subject to damage during use, the insulating material shall be protected by an outer covering of leather or other appropriate material.
  - (6) Rubber insulating equipment must be tested according to the schedule contained in Appendix F – Inspection Schedule for Rubber Insulating Equipment.
  - (7) Rubber insulating equipment must be stored in an area protected from light, temperature extremes, excessive humidity, ozone, and other substances and conditions that may cause damage.

(8) No repairs to rubber insulating equipment shall be attempted.

17. Insulated tools and materials.
  - a. Only insulated tools and equipment shall be used within the Limited Approach Boundary of exposed energized parts.
  - b. Insulated tools shall be rated for the voltages on which they are used.
  - c. Insulated tools shall be designed and constructed for the environment to which they are exposed and the manner in which they are used.
  - d. Fuse or fuse holder handling equipment, insulated for the circuit voltage, shall be used to remove or install a fuse if the fuse terminals are energized.
  - e. Ropes and hand-lines used near exposed energized parts shall be nonconductive.
  - f. Portable ladders used for electrical work shall have nonconductive side rails.
18. Protecting other workers and the general public.
  - a. Barricades shall be used in conjunction with safety signs to prevent or limit access to work areas containing live parts. Conductive barricades shall not be used where they might cause an electrical hazard. Barricades shall be placed no closer than the Limited Approach Boundary.
  - b. If signs and barricades do not provide sufficient protection, an attendant will be assigned to warn and protect pedestrians. The primary duty of the attendant shall be to keep unqualified persons out of the work area where an electrical hazard exists. The attendant shall remain in the area as long as there is a potential exposure to electrical hazards.
19. Contract Employees.
  - a. Safety programs used by contractors on The Company jobsites must meet or exceed all applicable guidelines of this Safety Program.
  - b. Contractors will be required to comply with applicable Health and safety regulations such as OSHA, NFPA, EPA.
  - c. Contractors may be required to submit copies of their Safety Program to the Director of Safety upon request.
20. Test Equipment.
  - a. Electrical testing equipment must be rated for the voltage and current and it will be used on and in a serviceable condition. See Appendix H – Electrical Test Equipment.
21. Training Requirements.
  - a. Employees who face a risk of electric shock, who are not qualified persons, shall be trained in and familiar with any electrically related safety practices necessary for their safety that pertains to their respective job assignments. Typical job classifications requiring this type of training are:
    - (1) Blue collar supervisors (1)
    - (2) Electrical and electronic engineers (1)
    - (3) Electrical and electronic equipment assemblers (1)
    - (4) Electrical and electronic technicians (1)
    - (5) Electricians
    - (6) Industrial machine operators (1)
    - (7) Material handling equipment operators (1)
    - (8) Mechanics and repairers (1)
    - (9) Painters (1)
    - (10) Riggers and roustabouts (1)
    - (11) Stationary engineers (1)
    - (12) Welders

Footnote (1) - Workers in these groups do not need to be trained if their work or the work of those they supervise does not bring them or the employees they supervise close enough to exposed parts of electric circuits operating at 50 volts or more to ground for a hazard to exist.

- b. Employees who face a risk of electrical hazard while working on or near exposed electrically energized components shall be trained. The degree of training provided shall be determined by the risk to the employee. Training will include:
- (1) What electrical hazards are present in the work place.
  - (2) How each electrical hazard affects body tissue.
  - (3) How to determine the degree of each hazard.
  - (4) How to avoid exposure to each hazard.
  - (5) How to minimize risk by body position.
  - (6) What personal protective equipment (PPE) is needed for the employee to execute his or her work assignment.
  - (7) How to select and inspect PPE.
  - (8) What employer-provided procedures, including specific work practices, must be implemented by the employee.
  - (9) How increased duration of exposure to an electrical hazard results in a higher frequency of injuries.
  - (10) How to perform a hazard/risk analysis.
  - (11) How to determine Limited, Restricted, and Prohibited Approach Boundaries and recognize that these boundaries are related to protection from exposure to electrical shock and electrocution.
  - (12) How to determine the Flash Protection Boundary and its relationship to the quantity of available energy.

22. Emergency Procedures. Employees working on or near exposed energized electrical conductors or circuit parts shall be trained in methods of release of victims from contact with exposed energized conductors or circuit parts. Employees shall be regularly instructed in methods of first aid and emergency procedures, such as approved methods of resuscitation, if their duties warrant such training.

23. Qualified Person Definition. A qualified person shall be trained and knowledgeable of the construction and operation of equipment or a specific work method and be trained to recognize and avoid the electrical hazards that might be present with respect to that equipment or work method.

- a. Such persons will be familiar with the proper use of precautionary techniques, PPE, including arc-flash, insulating and shielding materials, and insulating tools and test equipment
- b. An employee undergoing on-the-job training and who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training and who is under the direct supervision of a qualified person shall be considered to be a qualified person for the performance of those duties.
- c. Such persons permitted to work within the Limited Approach Boundary of exposed live parts operating at 50 volts or more shall, at a minimum, be additionally trained in all of the following:
- d. Skills and techniques necessary to distinguish exposed energized parts from other parts of electrical equipment.
- e. The skills and techniques necessary to determine nominal voltage of exposed live parts.
- f. The approach distance specified in Table 130.2(C) and the corresponding voltages to which the qualified person will be exposed.
- g. The decision-making process necessary to determine the degree and extent of the hazard and the personal protective equipment and job planning necessary to perform the task safely.

**Electrical Work Permit**

<b>Part I: To be completed by the requestor or supervisor of the job</b>		
Description of Circuit & Equipment:	Job Location:	
Description of Work to Be Done:		
Justification of why the circuit cannot be de-energized or the work delayed until the next scheduled outage:		
<b>Part II: To be completed by the qualified person(s) completing the work</b>		
(1) Detailed description of procedure to be used in performing the above work:		
(2) Description of safe work practices to be employed:		
(3) Voltage exposure (shock hazard analysis):		
(4) Determination of shock protection boundaries:		
(5) Results of flash hazard analysis:		
(6) Determination of flash protection boundaries:		
(7) PPE required to safely perform the task:		
(8) Method used to restrict access to the work area:		
(9) Do you agree the above work can be done safely?		
		YES (proceed to Part III) NO (return to requestor)
Qualified Person(s): _____	Date: _____	
Qualified Person(s): _____	Date: _____	
Qualified Person(s): _____	Date: _____	
<b>Part III: To be completed by the qualified person(s) completing the work</b>		
<b>Approvals:</b>		
<b>Name</b>	<b>Job Title</b>	<b>Date</b>
_____	_____	_____
_____	_____	_____
_____	_____	_____
<b>Note: Route Permit to Project Manager. Approving individual must be a licensed Master Electrician.</b>		

Figure 1 Electrical Work Permit

Table 1 Approach Boundaries to Live Parts for Shock Protection

**Approach Boundaries to Live Parts for Shock Protection**  
(All dimensions are distance from live parts to employee.)

(1) Nominal System Voltage Range, Phase To Phase	(2) Limited Approach Boundary		(4) Restricted Approach  Includes Inadvertent Movement Adder	(5) Prohibited Approach Boundary
	Exposed Movable Conductor	Exposed Fixed Circuit Part		
Less than 50	Not specified	Not specified	Not specified	Not specified
50 to 300	10 ft 0 in	3 ft 6 in	Avoid contact	Avoid Contact
301 to 750	10 ft 0 in	3 ft 6 in	1 ft 0 in	0 ft 1 in
751 to 15 kV	10 ft 0 in	5 ft 0 in	2 ft 2 in	0 ft 7 in
15.1 kV to 36 kV	10 ft 0 in	6 ft 0 in	2 ft 7 in	0 ft 10 in
36.1 kV to 46 kV	10 ft 0 in	8 ft 0 in	2 ft 9 in	1 ft 5 in
46.1 kV to 72.5 kV	10 ft 0 in	8 ft 0 in	3 ft 2 in	2 ft 1 in
72.6 kV to 121 kV	10 ft 8 in	8 ft 0 in	3 ft 3 in	2 ft 8 in
138 kV to 145 kV	11 ft 0 in	10 ft 0 in	3 ft 7 in	3 ft 1 in
161 kV to 169 k V	11 ft 8 in	11 ft 8 in	4 ft 0 in	3 ft 6 in
230 kV to 242 kV	13 ft 0 in	13 ft 0 in	5 ft 3 in	4 ft 9 in
345 kV to 362 kV	15 ft 4 in	15 ft 4 in	8 ft 6 in	8 ft 0 in
500 kV to 550 kV	19 ft 0 in	19 ft 0 in	11 ft 3 in	10 ft 9 in
765 kV to 800 kV	23 ft 9 in	23 ft 9 in	14 ft 11 in	14 ft 5 in

**Limited Approach Boundary:** Distance from an exposed live part within which a shock hazard exists. An unqualified person may not cross this boundary unless they are continuously escorted by a qualified person.

**Restricted Approach Boundary:** Distance from an exposed live part within which there is an increased risk of shock (due to electrical arc-over combined with inadvertent movement) for personnel working in close proximity to the live part. This boundary may only be crossed by a qualified person who is safely insulated or guarded from the live parts.

**Prohibited Approach Boundary:** Distance from an exposed live part within which work is considered the same as making contact with the live part. This boundary may only be crossed by a qualified person who has specific training to work on energized parts; has obtained an approved Energized Electrical Work Permit; and uses PPE appropriate for working on energized parts which are rated for the voltage and energy level involved. (Note: A permit is not required for work related to testing, troubleshooting, and voltage measuring).

**Flash Protection Boundary (not listed in table):** Distance from exposed live parts within which a person could receive a second degree burn if an electrical arc flash were to occur. This boundary may only be crossed by a qualified person wearing the appropriate PPE. For systems that are 600 volts or less, the Flash Protection Boundary shall be a minimum of four feet. An engineering analysis must be performed to determine the Flash Protection Boundary for systems that are above 600 volts. Table 3 Approach boundaries to live parts for shock protection.

Table 2 Hazard Risk Category Classification

**Hazard/Risk Category Classifications**

**HAZARD/RISK CATEGORY SELECTIONS**

<b>Task (assumes equipment is energized and work is done within the flash protection boundary)</b>	<b>Hazard/Risk Category</b>	<b>Use Voltage-Rated Gloves?</b>	<b>Use Voltage-Rated Tools?</b>
<b>Panelboards Rated 240 V and Below—Notes 1 and 3</b>			
Operate circuit breaker (CB) or fused switch with covers on	0	N	N
Operate CB or fused switch with covers off	0	N	N
Work on energized parts, including voltage testing	1	Y	Y
Remove/install CBs or fused switches	1	Y	Y
Remove bolted covers (to expose live parts)	1	N	N
Open hinged covers (to expose live parts)	0	N	N
<b>Panelboards or Switchboards Rated 240 V to 600 V (with molded case or insulated case CBs or fused switches)—Notes 1 and 3</b>			
Operate CB or fused switch with covers on	0	N	N
Operate CB or fused switch with covers off	1	N	N
Work on energized parts, including voltage testing	2*	Y	Y
<b>600 V-Class Motor Control Centers (MCCs) and Busways—Note 2, except as indicated with *, and Note 3</b>			
Operate CB or fused switch with enclosure doors closed	0	N	N
Read a panel meter while operating a meter switch	0	N	N
Operate CB or fused switch with enclosure doors open	1	N	N
Work on energized parts, including voltage testing	2*	Y	Y
Work on control circuits while working near exposed live parts 120 V or below	0	Y*	Y
Work on control circuits with exposed live parts above 120 V	2*	Y	Y
Insert or remove individual starter buckets from MCC—Note 4	3	Y	N
Apply safety grounds, after voltage test	2*	Y	N
Remove bolted covers to expose live parts	2*	N	N
Open hinged covers to expose live parts	1	N	N
<b>600 V-Class Switchgear (with power circuit breakers or fused switches)—Notes 5 and 6</b>			
Operate CB or fused switch with enclosure doors closed	0	N	N
Read a panel meter while operating a meter switch	0	N	N
Operate CB or fused switch with enclosure doors open	1	N	N
Work on energized parts, including voltage testing	2*	Y	Y
Work on control circuits while working near exposed live parts 120 V or below	0	Y	Y*
Work on control circuits while working near exposed live parts more than 120 V—Note 5	2*	Y	Y
Insert or remove (rack) CBs from cubicles, doors open	3	N	N
Insert or remove (rack) CBs from cubicles, doors closed	2	N	N
Apply safety grounds, after voltage test	2*	Y	N
Remove bolted covers (to expose live parts)	3	N	N
Open hinged covers (to expose live parts)	2	N	N

Table 3 Hazard/Risk Category Selections

**HAZARD/RISK CATEGORY SELECTIONS**

Task (assumes equipment is energized and work is done within the flash protection boundary)	Hazard/Risk Category	Use Voltage-Rated Gloves?	Use Voltage-Rated Tools?
<b>Other Equipment, 600 V-Class (277 V through 600 V, nominal)—Note 3</b>			
<b>Lighting or small power transformers (600 V, maximum)</b>			
Remove bolted covers to expose live parts	2*	N	N
Open hinged covers to expose live parts	1	N	N
Insertion or removal of revenue meter	2*	Y	N
Work on energized parts, including voltage testing—Note 5	2*	Y	Y
Apply safety grounds, after voltage test	2*	Y	N
<b>NEMA E2 (fused contactor) motor starters, 2.3 kV through 7.2 kV</b>			
Operate contactor with enclosure doors closed	0	N	N
Read a panel meter while operating a meter switch	0	N	N
Operate contactor with enclosure doors open	2*	N	N
Work on energized parts, including voltage testing	3*	Y	Y
Work on control circuits while working near exposed live parts 120 V or below	0	Y	Y
Work on control circuits while working near live parts above 120 V	3	Y	Y
Insert or remove (rack) starters from cubicles with doors open	3	N	N
Insert or remove (rack) starters from cubicles with doors closed	2	N	N
Apply safety grounds, after voltage test	3	Y	N
Remove bolted covers (to expose live parts)	4	N	N
Open hinged covers (to expose live parts)	3	N	N
<b>Metal-Clad Switchgear, 1 kV to 38 kV</b>			
Operate a CB or fused switch with enclosure doors closed	2	N	N
Read a panel meter while operating a meter switch	0	N	N
Operate a CB or fused switch with enclosure doors open	4	N	N
Work on energized parts, including voltage testing	4	Y	Y
Work on control circuits while working near live parts 120V or below	2	N	N
Work on control circuits while working near live parts above 120V	4	Y	Y
Insert or remove (rack) CBs from cubicles with doors open	4	N	N
Insert or remove (rack) CBs from cubicles with doors closed	2	N	N
Apply safety grounds, after voltage test	4	Y	N
Remove bolted covers (to expose live parts)	4	N	N
Open hinged covers (to expose live parts)	3	N	N
Open voltage transformer or control power transformer compartments	4	N	N
<b>Other Equipment, 1 kV to 38 kV</b>			
Operate switch, doors closed	2	N	N
Work on energized parts, including voltage testing	4	Y	Y
Remove bolted covers—up to and including 15 kV-class equipment (to expose energized parts)	4	N	N
Open hinged covers (to expose bare, energized parts)	3	N	N
Operate outdoor disconnect switch (hookstick operated)	3	Y	Y
Operate outdoor disconnect switch (gang-operated, from grade)	2	Y	Y
Examine insulated cable in manhole or other confined space	4	Y	N
Examine insulated cable in open area	2	Y	N

**Legend:**

Voltage-rated gloves are gloves rated and tested for the maximum line-to-line voltage upon which work will be done.

Voltage-rated tools are tools rated and tested for the maximum line-to-line voltage upon which work will be done.

2\* A double-layer switching hood and hearing protection are required for this task in addition to the other hazard/risk category requirements.

Y Yes (required) N No (not required)

**Notes:**

1. 25 kA short-circuit current available, 0.03 second (2-cycle) fault-clearing time.
2. 65 kA short-circuit current available, 0.03 second (2-cycle) fault-clearing time.
3. For less than 10 kA short-circuit current available, the hazard/risk category required may be reduced by one number.
4. 65 kA short-circuit current available, 0.33 second (20-cycle) fault-clearing time.
5. 65 kA short-circuit current available, up to 1.0 second (60-cycle) fault-clearing time.
6. For less than 25 kA short-circuit current available, the hazard/risk category required may be reduced by one number.

Table 4 Personal Protective Equipment Matrix

**Personal Protective Equipment Matrix**

Protective Clothing and Equipment	Protective Systems for Hazard/Risk Category					
	<sup>(9)</sup> - 1	0	1	2	3	4
Non-melting (according to ASTM F 1506-00) or Untreated Natural Fiber						
a. T-shirt (short-sleeve)	X			X	X	X
b. Shirt (long-sleeve)		X				
c. Pants (long)	X	X	X <sup>(4)</sup>	X <sup>(6)</sup>	X	X
FR Clothing <sup>(3)</sup>						
a. Long-sleeve shirt			X	X	X <sup>(9)</sup>	X
b. Pants			X <sup>(4)</sup>	X <sup>(6)</sup>	X <sup>(9)</sup>	X
c. Coverall			<sup>(5)</sup>	<sup>(7)</sup>	X <sup>(9)</sup>	<sup>(5)</sup>
d. Jacket, parka, or rainwear			AN	AN	AN	AN
FR Protective Equipment						
a. Flash suit jacket (multi-layer)						X
b. Flash suit pants (multi-layer)						X
c. Head protection						
1. Hard hat			X	X	X	X
2. FR hard hat liner					AR	AR
d. Eye protection						
1. Safety glasses	X	X	X	AL	AL	AL
2. Safety goggles				AL	AL	AL
e. Face and head area protection						
1. Arc-rated face shield, or flash suit hood				X <sup>(8)</sup>		
2. Flash suit hood					X	X
3. Hearing protection (ear canal inserts)				X <sup>(8)</sup>	X	X
f. Hand protection						
Leather gloves <sup>(2)</sup>			AN	X	X	X
g. Foot protection						
Leather work shoes			AN	X	X	X
<b>PPE Arc Flash Gear Required</b>	<b>N/R</b>	<b>N/R</b>	<b>4cal</b>	<b>8cal</b>	<b>25cal</b>	<b>40cal</b>

AN = As needed AR = As required AL = Select one in group X = Minimum required

**Notes:**

- (1) See Table 130.7 (C) (11). Arc rating for a garment is expressed in cal/cm<sup>2</sup>.
- (2) If voltage-rated gloves are required, the leather protectors worn external to the rubber gloves satisfy this requirement.
- (3) Hazard/Risk Category Number "-1" is only defined if determined by Notes 3 or 6 of Table 130.7(C)(9) (a).
- (4) Regular weight (minimum 12 oz/yard<sup>2</sup> fabric weight), untreated, denim cotton blue jeans are acceptable in lieu of FR pants. The FR pants used for Hazard/Risk Category 1 shall have a minimum arc rating of 11 cal.
- (5) Alternate is to use FR coveralls (minimum arc rating of 11 cal) instead of FR shirt and FR pants.
- (6) If the FR pants have a minimum arc rating of 11 cal, long pants of non-melting or untreated fiber are not required beneath the FR pants.
- (7) Alternate is to use FR coveralls (minimum arc rating of 11 cal) over non-melting or untreated natural fiber pants and T-shirt.
- (8) A face shield with a minimum arc rating of 11cal, with wrap-around guarding to protect not only the face, but also the forehead, ears, and neck (or alternatively, a flash suit hood), is required.
- (9) Alternate is to use two sets of FR coveralls (the inner with a minimum arc rating of 4cal and outer coverall with a minimum arc rating of 5) over non-melting or untreated natural fiber clothing.

Table 5 Inspection Schedule for Rubber Coated Equipment

## Inspection Schedule for Rubber Insulating Equipment

(\*) – If the insulating equipment has been electrically tested but not issued for service, it may not be placed into service unless it has been electrically tested within the previous 12 months.

Type of Equipment	When to Test
Rubber insulating line hose	Upon indication that insulating value is suspect
Rubber insulating covers	Upon indication that insulating value is suspect
Rubber insulating blankets	Before first issue and every 12 months thereafter (*)
Rubber insulating gloves	Before first issue and every 6 months thereafter (*)
Rubber insulating sleeves	Before first issue and every 12 months thereafter (*)
Rubber insulated tools	Before each use. Do not use the tool if yellow color shows through orange rubber coating.

Table 6 Rubber Glove Selection

### Rubber Glove Selection

Rubber gloves shall be selected based on the maximum use voltage (phase-to-phase or phase-to-ground) in accordance with the following table:

Class	Voltage	Label
Class 00	500 V	Red or Yellow
Class 0	1,000	V Red
Class 1	7.5 kV	White
Class 2	17 kV	Yellow
Class 3	26.5 kV	Green
Class 4	36 kV	Orange

Arc flash protection - Leather or FR gloves shall be worn where required for arc flash protection.

Shock protection - Employees shall wear rubber insulating gloves where there is a danger of hand and arm injury from electric shock due to contact of live parts. Where insulating rubber gloves are worn for shock protection, leather protectors shall be worn over the rubber gloves.

Class 0 or class 00 gloves without leather protectors shall be used ONLY for making fine adjustments, taking measurements, or performing other similar intricate work.

Table 7 Electrical Test Equipment Inspection

### Electrical Test Equipment Inspection

Electrical test equipment falling into Category III (600V) or (1000V) and Category IV (600V) must be stamped to indicate the appropriate category. If your equipment is not stamped as Category III or IV, (or Cat III, Cat IV), it should only be used for Category I and II work.

Look for Independent Testing and Certification. Verify your test tools have been tested and certified by two or more independent testing laboratories listed on the following pages.

Use the correct lead for the test. Make sure it is marked with a category rating that covers what you are testing. Replace fuses with only the manufacture's authorized fuse.

**Inspect Your Tools** – National Fire Protection Association (NFPA) Standard 70E says test tools must be visually inspected frequently to help detect damage and ensure proper operation.

- Check for a broken case, worn test leads or a faded display.
- Inspect your test leads and probes for frayed or broken wires.
  - Be sure they have:
    - shrouded connectors
    - finger guards
    - CAT ratings that equal or exceed those of the meter
    - double insulation
    - a minimum of exposed metal on the probe tips
- Use the meter's own continuity testing function to check for internal breaks. Check test lead resistance:
  - A: Insert leads in V/ $\Omega$  and COM inputs.
  - B: Select  $\Omega$ , touch probe tips. Good leads will read 0.1 - 0.3  $\Omega$ .

**Supplementary Inspection** –

- Look for 600 volt or 1000 volt, CAT III or 600 volt, CAT IV rating on the front of meters and testers, and a "double insulated" symbol on the back.
- Check the manual to verify that the ohms and continuity circuits are protected to the same level as the voltage test circuit.
- Make sure that the amperage and voltage of meter fuses meets specifications. Fuse voltage must be as high or higher than the meter's voltage rating.
- Use the meter's own test capability to ensure that the fuses are in place and working right.
  - Step 1:** Plug test lead in V/ $\Omega$  input. Select  $\Omega$ .
  - Step 2:** Insert probe tip into mA input. Read value.
  - Step 3:** Insert probe tip into A input. Read value.

A good fuse should show a value close to zero. Check your manual for the specified reading. Using properly functioning test tools is vital to help protect yourself from possible injury or death. Tools that fail any of these inspections should be replaced with new test tools from a leading manufacturer.

S. Emergency Action Plans.

1. An emergency action plan is a written set of procedures for responding to emergencies that could occur at a workplace or on a jobsite.
2. General:
  - a. Make sure that you are familiar with your company's emergency action plan.
  - b. When working in a plant; industrial process facility or any other established facility, you should be familiar with that facility's emergency action plan as well.
3. Specifics:
  - a. Know who to report to and how to report fires, chemical spills, excavation cave-ins, confined space incidents, injuries and other jobsite emergencies.
  - b. Be familiar with all established emergency evacuation procedures.
  - c. Learn the name of the person who will account for the building or structure's workers and other occupants, and where to meet that person if an emergency occurs.
  - d. Know how to quickly access emergency telephone numbers and the nearest telephone. If mobile telephones do not work on your jobsite, make sure that you know where the closest land line phone is located at all times.
  - e. Learn the address of the workplace and memorize landmarks that will help you guide emergency medical or rescue personnel to a victim.
  - f. Never attempt a rescue in an excavation, confined space or any other potentially hazardous area. Instead, contact emergency medical and rescue services and direct them to the incident.

T. Ergonomics.

1. Following proper ergonomic work practices will help prevent fatigue and injury.
2. Supervision must periodically evaluate work areas and employees' work techniques to assess the potential for and prevention of injuries. New operations should be evaluated to engineer out hazards before work processes are implemented.
3. Manual lifting equipment such as dollies, hand trucks, lift-assist devices, jacks, carts, hoists are provided for employees. Use of provided manual lifting equipment by employees must be enforced by supervisors. See Section 6 MM *Material Handling & Storing*.
4. When lifting material bend your knees and keep it close to your body. See **Figure 2 – Proper Lifting Technique** for the correct way to lift material.

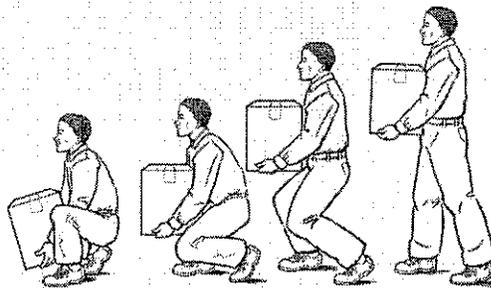
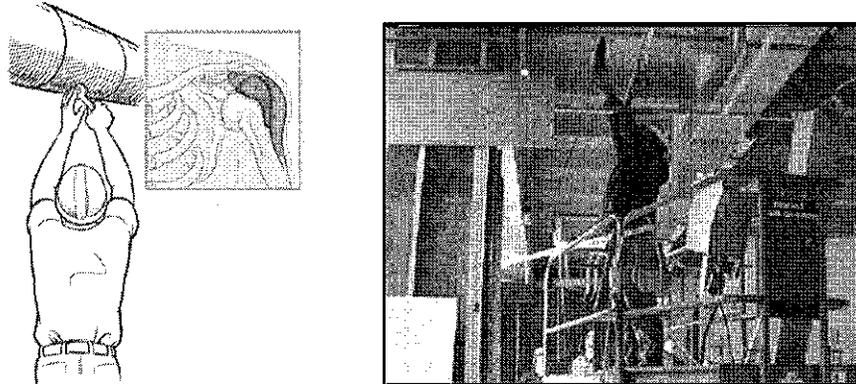


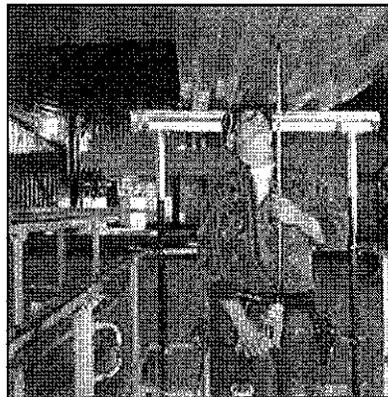
Figure 2 Proper Lifting Technique

5. Try to avoid long periods of working directly overhead. This creates shoulder strain. When possible adjust your body height to bring your work area closer to your chest height. Get a taller ladder or raise your lift if working from one. See **Figure 3 – Overhead Work Postures** for postures you should try to avoid.



**Figure 3 Overhead Work Postures**

6. If you can't raise yourself closer to your work task use tools designed to reduce overhead reaching as pictured in **Figure 4 - Drill Bit Extension** below.



**Figure 4 Drill Bit Extension**

**U. Excavations.**

1. An excavation is any manmade cut, cavity, trench or depression in the earth that was formed by the removal of earth.
2. General:
  - a. Find out who your company has designated as the "competent person" (see page xv for definition) for the excavation in which you will be working.
  - b. Make sure there is a protective system in place any time you enter an excavation that is 5 feet deep or deeper, unless the excavation is in solid rock *and* the "competent person" indicates that it is safe to enter.
  - c. Make sure that the "competent person" has determined that the protective system will resist, without failure, all loads that could reasonably be applied to it.
  - d. Ensure that the "competent person" inspects the excavation and surrounding areas before work starts each day, throughout each shift, and immediately after a rainstorm or other potentially harmful occurrence.

- e. When shoring or bracing is used as a protective system, make sure the "competent person" inspects it before use, daily and immediately after each rainstorm.
  - f. Check that there are adequate barricades, signs and warning lights to mark the location of the excavation.
  - g. Ensure that there is a system in place such as barricades, hand signals, mechanical signals or stop logs to keep equipment from approaching the excavation.
  - h. When working near the edge of an excavation that is more than 6feet deep and difficult to see, use a guardrail system, such as fences, barricades or covers, to keep people from falling in.
  - i. Ensure that a guardrail system is in place on any walkways over excavations that are 6feet deep or deeper.
3. Prior to Excavating:
- a. If you are responsible for digging an excavation, make sure to identify and properly mark all underground utilities such as sewer lines, telephone lines, electrical power lines and water lines.
  - b. Call the appropriate Dig-Safe company (1-888-DIG-SAFE, or 811) to conduct the underground survey.
  - c. Underground Utility Marking Color Code:
    - Red Electric Power Lines, Cables, Conduit and Lighting Cables
    - Yellow Gas, Oil, Steam, Petroleum or Gaseous Materials
    - Orange Communication, Alarm or Signal Lines, Cables or Conduit
    - Blue Potable Water
    - Green Sewers and Drain Lines
    - Purple Reclaimed Water, Irrigation and Slurry Lines
    - Pink Temporary Survey Markings
    - White Proposed Excavation
4. Excavating:
- a. Keep excavated materials and equipment at least 2 feet away from the side of the excavation.
  - b. Whenever necessary, use retaining devices to ensure that workers in an excavation are not exposed to falling material.
  - c. When approaching the estimated location of an underground utility, use a safe and acceptable method for determining the utility's exact location.
  - d. Protect, support or remove exposed utilities as necessary to keep workers safe.
5. Working in an Excavation:
- a. Before entering an excavation that is more than 5 feet deep, but less than 20 feet deep, ensure that the excavation has a portable trench box or has been shored, braced or sloped to the angle of repose established for its specific soil type. Deeper excavations may require more sophisticated protective measures. Check with your supervisor before proceeding.
  - b. Before entering an excavation that is 4 feet deep or deeper, ensure that there is a ladder, ramp, stairway or another safe method to exit the excavation within 25 feet of where you will be working.
  - c. Never put yourself in a position where you could be under an overhead load handled by lifting or digging equipment.
  - d. Never work alone inside an excavation.
  - e. Do not work in an excavation with standing water or one in which water is accumulating, unless it has been inspected by the "competent person" and adequate employee protective measures are in place.
  - f. Vacate the excavation immediately any time you observe a potential *protective* system failure or any other potential hazard.
6. After Completing Work in an Excavation:
- a. Remove the protective system by starting at the bottom of the excavation and progressing upward until removal has been completed.
  - b. Backfill the excavation as the protective system is removed.

V. Fall Prevention & Protection.

1. Fall prevention refers to systems that prevent workers from falling such as a guardrail system or hole cover. Fall protection refers to systems that help protect workers from injury when they do fall, such as a personal fall arrest system or a safety net system.

2. General:

- a. When you could potentially fall more than 6 feet to a lower level, make sure you are protected by a guardrail system, personal fall arrest system or hole covers. This 6-foot rule does not apply to ladders or scaffolds. Review ladders and scaffolds for further information.
- b. Check to ensure that elevated ramps, runways and other walkways that are 6 feet or more above a lower level have guardrail systems in place.
- c. Before stepping on elevated walking/working surfaces, make sure they have the strength and structural integrity to support the full weight and force of the workers equipment and materials that could be placed on them.
- d. Fall protection equipment will meet the requirements of applicable ANSI, ASTM, or OSHA requirements.

3. Guardrail Systems:

- a. Make sure that the top edge members of guardrail systems are between 39 inches and 45 inches above the walking/working surface and that they can withstand 200 pounds of force in any outward or downward direction.
- b. Check that midrails are halfway between the top edge members and the walking/working surface (i.e. approximately 21 to 22 inches) and that they can withstand 150 pounds of force in any outward or downward direction.
- c. Make sure that toeboards are installed to keep tools and materials from falling to a lower level, that they are secured, and at least 3 ½ inches high.
- d. Use a personal fall arrest system when any part of a guardrail system has to be removed to facilitate materials handling and you could potentially fall through the opening by working near it.

4. Hole Covers:

- a. Holes measuring 2 inches and larger must be covered. Use hole covers on holes in floors, roofs and other walking/working surfaces only when the holes are small enough to be safely covered (i.e. holes three feet across may need extra support).
- b. When vehicles, boom lifts, or scissor lifts will be driving over a hole cover, make sure the cover can withstand twice the maximum axle load of the largest vehicle you expect to drive across it.
- c. Even if a hole cover will not be exposed to vehicular traffic, make sure it can safely support twice the aggregate weight of the workers, equipment and materials that could be placed on it.
- d. Mark the cover with "Hole" or use the jobsite's color code system if one exists.

5. Toeboards are boards installed on guardrail systems, scaffolds, aerial lifts, leading edges and other areas where objects could fall and become hazardous to workers below.

a. General:

- (1) Make sure toeboards are installed on all guardrail systems, aerial lifts and other areas where tools, materials and/or equipment could be knocked off your working surface to a level below.
- (2) Check that toeboards are at least 3 1/2 inches high and made of strong, durable materials.
- (3) Ensure that toeboards do not have openings of more than one (1) inch between ends.

6. Personal Fall Arrest Systems:

a. When using a personal fall arrest system, verify that you have all of the system parts including:

- (1) An anchorage point that is not being used to support or suspend a platform, and which is capable of supporting at least 5,000 pounds of force for each worker tied off to it.

- (2) Connectors.
  - (3) Full body harness.
  - (4) Lanyard with deceleration device (built into some lanyards).
  - (5) Retractable in lieu of lanyard.
  - (6) Lifeline (if not directly attaching to an anchor point).
- b. Use any suitable combination of the above system parts.
- c. Only use locking snaphooks.
- d. Get the proper training before using this system.
- e. Do not use any device if it has been previously used for rigging material.
- f. Proper harness fit. It is extremely important that your harness fits and is properly adjusted. The Company uses Guardian Seraph, Miller, and Titan harnesses. Follow Figure 5 – **Guardian Seraph Harness Size Chart** for the proper method to put on and take of a harness. Follow Figure 6 – **Donning a Harness** to select the correct harness size. When using harnesses from other manufactures be sure to follow their sizing requirements. Failure to do so can result in serious injury or death, and proper connection of both types of straps is essential to fall safety. After donning a harness, make sure to check:
- (1) **CHEST STRAP:** Should be positioned in the middle of your chest 6" to 8" below the trachea but not below the sternum]. If the chest strap is positioned too high, the strap may move upwards during a fall arrest causing you to run the risk of strangulation. If the chest strap is too low or not connected at all, you could fall out of your harness during a fall.
  - (2) **LEG STRAPS:** Proper adjustment of the leg straps is critical for safety. Leg straps should be snug, but not snug to the point that they obstruct normal blood circulation in the legs. Failure to wear leg straps will not secure your body within the harness during a fall and could lead to serious injury or death.
  - (3) **SUB-PELVIC STRAP:** Provides support in the event of a fall, and also provides support when used for positioning. In a seated position, the sub-pelvic strap should comfortably provide a "seat" for the buttocks. In the event of a fall, simply lift up your legs to transfer weight to the sub-pelvic strap.
- g. Calculating fall and swing clearance. When setting up and using a personal fall arrest system, fall clearance and swing fall hazards are critical issues. Should a fall occur, there must be sufficient clearance below the user to arrest the fall before the user strikes the ground or any other object. The user of the equipment must determine if the system will arrest the fall within the available clearance. Some factors that affect this determination include anchorage location, type and length of connecting system (lanyard, self-retracting lifelines, rope grab), deceleration distance (the elongation of the decelerating device when deployed - allow 3.5'), worker height, movement of harness attachment element (allow a safety factor of 2.5 ft.). Follow Figure 7 – **Lanyard Fall Distance** for required clearance distance when using lanyards with built-in de-accelerators (standard total clearance is 17 ½ to 18 ½ feet). When using a retractable device the standard total clearance distance is 13 ½ feet. Follow Figure 8 – **Swing Clearance** to calculate total swing.
- h. Types of material damage. The following may cause damage to your harness and lanyard.
- (1) Heat. webbing becomes brittle and has a shriveled brownish appearance. Fibers will break when flexed. Should not be used above 180°F.
  - (2) Chemical. Change in color usually appearing as a brownish smear or smudge. Transverse cracks when rope/ webbing is bent over a mandrel. Loss of elasticity in rope/webbing.
  - (3) Molten metal or flame. Rope/webbing strands fuse together. Hard shiny spots. Hard and brittle feel.
  - (4) Paints and solvents. Paint which penetrates and dries restricts movement of fibers. Drying agents and solvents in some paints will appear as chemical damage.

- i. Cleaning and storage. Basic care of Fall Protection equipment will prolong the durable life of the unit and will contribute toward the performance of its vital safety function. Proper storage and maintenance after use are as important as cleansing the equipment of dirt, corrosives, or contaminants. Storage areas should be clean, dry and free of exposure to fumes or corrosive elements. Wipe off all surface dirt with a sponge dampened in plain water. Squeeze the sponge dry. Dip the sponge in a mild solution of water and commercial soap or detergent. Work up a thick lather, with a vigorous back and forth motion. Then wipe dry with a clean cloth. Hang freely to dry, but away from excessive heat, steam, or long periods of sunlight.
- j. Life expectancy of harnesses. It is the position of Miller Fall Protection (MFP) and Guardian to use a 5-year life expectancy from date of first use as a guideline on all harnesses. This recommendation is a general guideline, and is not to be used in lieu of the harness inspections. This guideline only applies to product exhibiting no visual damage and that has not been exposed to chemicals, abnormal heat, or excessive ultra-violet light. It is possible that the equipment will last longer depending on the care and use the equipment may see. Following these instructions may still necessitate removing the harness from service prior to the expiration of the 5-year life expectancy guideline. Likewise, proper adherence to the inspection and maintenance criteria may extend the useful life beyond five years. Ultimately, it is the responsibility of the end-user to determine when the harness is unfit for use and should be removed from service. Products removed from service should be disposed of in a manner that prevents inadvertent further use (i.e. cut the hooks and/or D-ring off to prevent further use). **When in doubt – Remove it from service!**
- k. Marking/Identifying web products. Marking/Identifying various fall protection products (i.e., belts, harnesses, lanyards, anchorage straps, etc.,) made of webbing is appropriate as long as acceptable materials or processes are used. Information such as company name and inspection status is often applied to the product for proper identification. The following guidelines should be observed and the special conditions noted.
  - (1) Inspection status/log labels applied to the product at the time of manufacture or inspection can be used to record inspection dates. Permanent markers which are water resistant and quick-drying (ex. Sanford Sharpie permanent markers) should be used.
  - (2) Specific punches can be used on the inspection log label to represent a month the inspection was performed. The web should not be punched.
  - (3) Separate identification tags/labels can be applied to the product. A location that will not interfere with the products performance should be selected (i.e., away from snap hooks, connecting rings, buckles, etc.).
  - (4) The method of attaching separate identification tags should not affect the strength of the web. Riveting, punching holes and gluing the separate label to the web is not recommended in the field. Plastic or wire tie type fastener should be used. The fastener can be passed through or around a web or web loop (opening) for attachment.
  - (5) Marking directly on the web can be performed with permanent type markers. Permanent markers which are waterproof/water resistant and quick-drying (ex. Avery Dennison Marks-A-Lot, Sanford Sharpie permanent marker) should be used.
  - (6) Paint and/or paint pens **should not** be used to mark directly on the web. Paint can penetrate the web fibers, dry and cause the fibers to break when flexed.
  - (7) Some types of permanent inks can be used to identify the product. Contact the factory for approval of specific inks.
  - (8) Some solvents used in inks and other marking products can cause loss of strength in webbing, especially at elevated temperatures and high concentrations. Nitrobenzene, dichlorobenzene, phenol/tetrachlorethane, and benzyl alcohol as an example effect polyester fibers (used in most DBI/SALA web products). Contact the factory for approval of specific materials.

- l. Inspecting harness. Follow **Figure 9 – Harness Inspection** for steps to follow during the inspection process.
- m. Suspension trauma. What is Suspension Trauma? Otherwise known as Orthostatic Intolerance this condition can occur when a person remains suspended at height (after a fall) for even short periods of time. Suspension in a harness may cause blood to pool in the veins of the legs which can result in unconsciousness; if not rescued promptly, serious injury or death may occur.
  - (1) It is extremely important to ensure prompt rescue of suspended personnel is available and provided. Immediately call for rescue when a person is suspended and cannot perform a self-rescue. If the person is unconscious after rescue, check for pulse and respiration and perform CPR as required. If a conscious person is rescued from suspension have them remain in a seated position for 30 minutes to allow any pooled blood in their legs to slowly return to their heart.
  - (2) A Suspension Trauma Safety Strap is designed to prevent suspension trauma while a worker is awaiting rescue. The strap allows the suspended worker to stand up in their harness relieving the pressure being applied to their arteries and veins around the top of the legs. The continuous loop design allows both sides of the harness to relieve the pressure being applied to the legs. The strap accommodates either having one foot or both feet in the loop at a time - it will relieve the pressure to both sides with just one foot in allowing for added movement of the legs. The strap allows for increased comfort, balance and improved circulation in the legs while suspended and waiting for rescue.
  - (3) To help prevent suspension trauma each harness is fitted with DBI Sala Suspension Trauma Safety Straps. They are fast and easy to install and operate. The two packs are compact, lightweight and easily installed to most harness sizes, styles and brands. To attach, simply choke the pack around the harness web at the hip. After a fall, the packs can quickly be unzipped, deploying the web loop and hook straps. These are easily connected and adjusted to provide a strap for the foot to conveniently step into. This allows the worker to stand in their harness and relieve the pressure on the legs while waiting for rescue. Follow **Figure 10 DBI Sala Suspension Trauma Safety Strap** for installation and use.

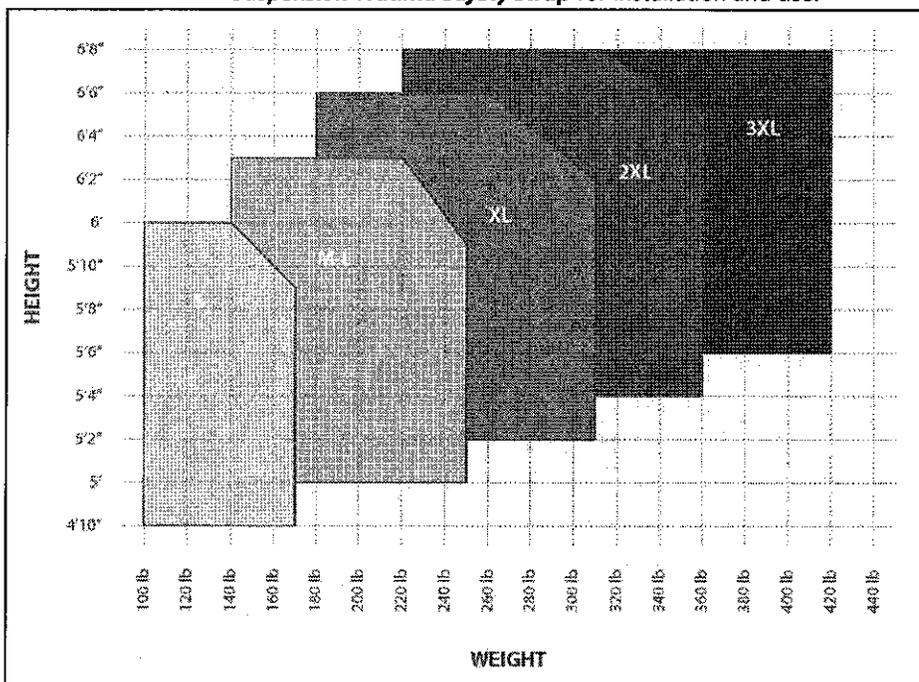


Figure 5 Guardian Seraph Harness Size Chart

<p>1. Hold harness by back D-ring. Shake harness to allow all straps to fall in place.</p>		<p>2. If chest, waist and/or leg straps are buckled, release straps and unbuckle at this time.</p>	
<p>3. Slip straps over shoulders so D-ring is located in middle of back between shoulder blades.</p>		<p>4. Pull leg strap between legs and connect to opposite end. Repeat with second leg strap. Connect waist strap, if present. Waist strap should be tight but not binding.</p>	
<p>5. Connect chest strap and position in midchest area 6" to 8" below the trachea but not below the sternum. Tighten to keep shoulder straps taut.</p>		<p>6. After all straps have been buckled, tighten all webbing so that harness fits snug, but still allows full range of movement. Pass excess strap through loop keepers.</p>	
<p>7. To remove harness, reverse procedure.</p>	<p>8. Hang the harness by back D-ring to help it keep its shape when not in use and provide the worker with a starting point when next attempting to don the harness.</p>		

Figure 6 Donning a Harness

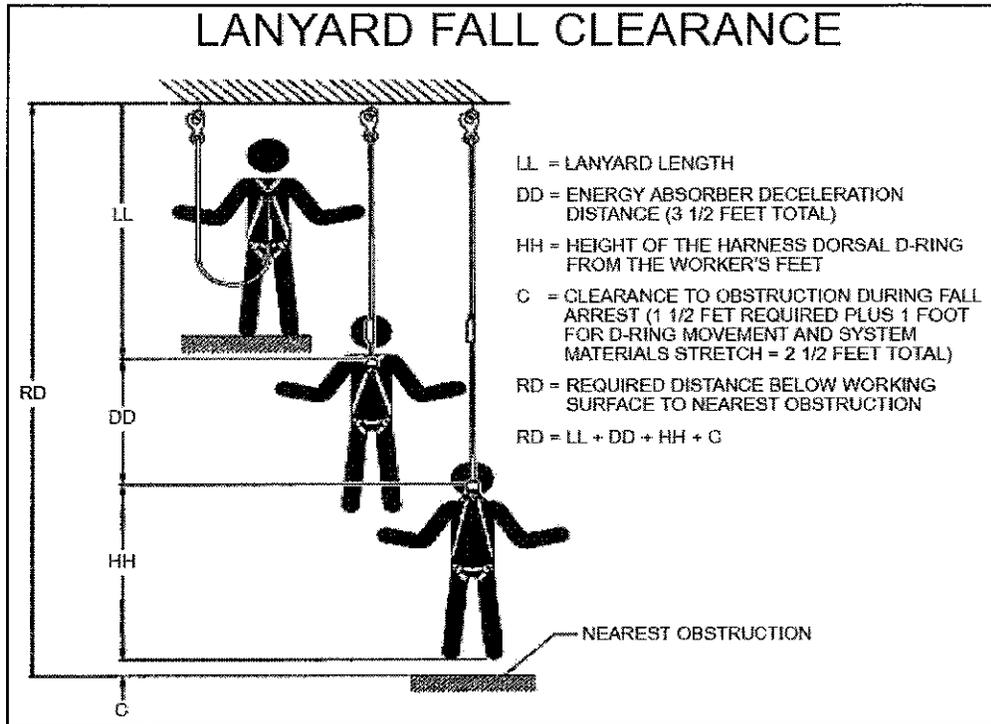


Figure 7 Lanyard Fall Distance

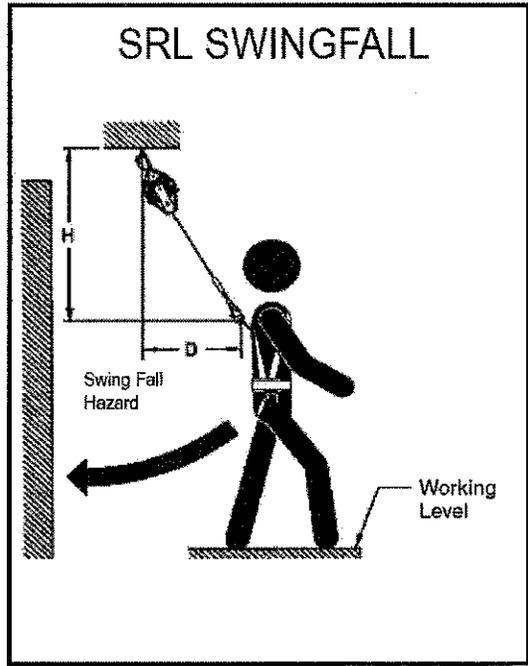
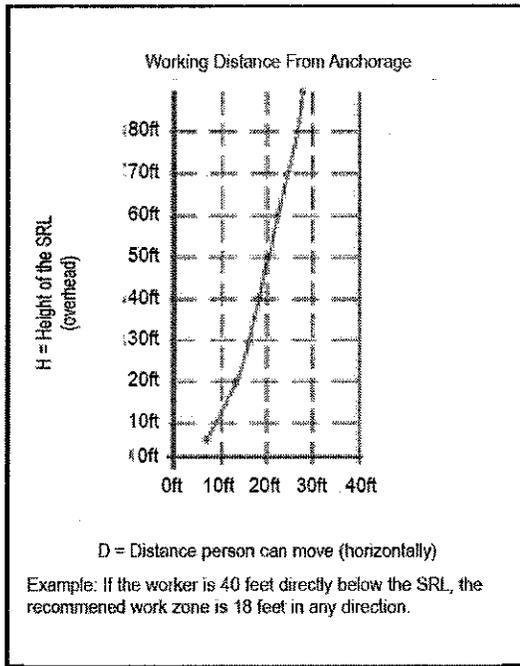


Figure 8 Swing Clearance

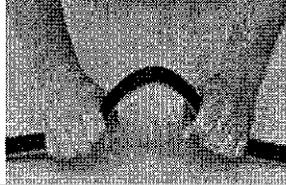
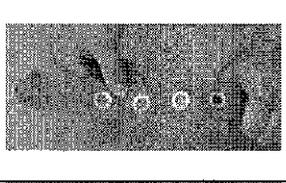
<p>1. Webbing/Stitches Grasp the webbing with your hands 6 inches to 8 inches apart. Bend the webbing in an inverted "U" as shown. The surface tension resulting makes damaged fibers or cuts easier to detect. Follow this procedure the entire length of the webbing, inspecting both sides of each strap. Watch for frayed edges, broken fibers, pulled stitches, cuts, burns, and chemical damage.</p>	
<p>2. D-Rings/Pads Check D-rings for distortion, cracks, breaks, and rough or sharp edges. The D-ring should pivot freely. Inspect for any unusual wear, frayed or cut fibers, or broken stitching of the D-ring attachments. Pads should also be inspected for cracks, excessive wear, or other signs of damage.</p>	
<p>3. Buckles Inspect for any unusual wear, frayed or cut fibers, or broken stitching of the buckle attachments.</p>	
<p>4. Tongue Buckles/Grommets Buckle tongues should be free of distortion in shape and motion. They should overlap the buckle frame and move freely back and forth in their socket. Roller should turn freely on frame. Check for distortion or sharp edges. Inspect for loose, distorted or broken grommets. Webbing should not have additional punched holes.</p>	
<p>5. Friction and Slotted Mating Buckles Inspect the buckle for distortion. The outer bars and center bars must be straight. Pay special attention to corners and attachment points at the center bar.</p>	
<p>6. Quick-Connect Buckles Inspect the buckle for distortion. The outer bars and center bars must be straight. Make sure dual-tab release mechanism is free of debris and engages properly.</p>	

Figure 9 Harness Inspection

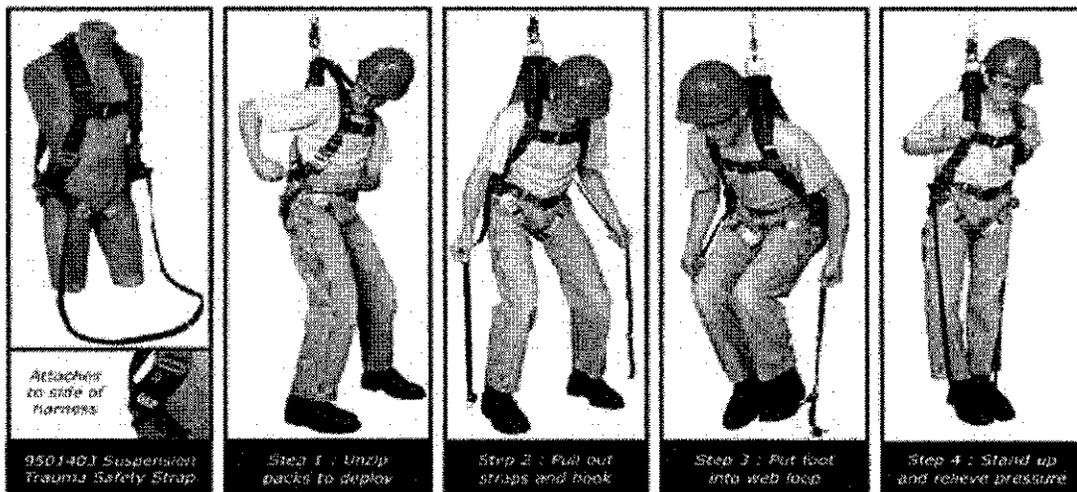


Figure 10 DBI Sala Suspension Trauma Safety Strap

7. Working on Roofs or Floors. Work on roofs or floors that are 6 feet or more above a lower level, and have an unprotected leading edge, require employee fall protection. Guardrails, safety nets, and personal fall arrest systems are preferred but when they are infeasible or their use creates a greater hazard, a Fall Protection Plan, utilizing the Control Access Zone system can be substituted. See paragraph 8 - *Fall Protection Plan* of this section for more details.

a. Definitions:

- (1) **Leading Edge.** Leading edge means the edge of a floor, roof, or other walking/working surface which changes location as additional floor, roof, or decking is placed or constructed. A leading edge is considered to be an "unprotected side or edge" during periods when it is not actively and continuously under construction.
- (2) **Warning Line System.** Warning line system means a barrier erected around all side of a roof to warn employees that they are approaching an unprotected roof side or leading edge, and which designates an area in which roofing work may take place without the use of guardrail, body harness, or safety net systems to protect employees in the area.
- (3) **Control Access Zone (CAZ) System.** A controlled access zone means an area designated and clearly marked, in which leading edge work may take place without the use of guardrail, safety net or personal fall arrest systems to protect the employees in the area.
- (4) **Roofing work.** Roofing work means the hoisting, storage, application, and removal of roofing materials and equipment, including related insulation, sheet metal, and vapor barrier work, but not including the construction of the roof deck.

b. **Warning Line Systems.** Warning line systems are for use on roofs. When used a Safety Monitor must be utilized and all employees on the roof must be trained in the warning line system. Warning line systems and their use shall comply with the following provisions:

- (1) The warning line shall be erected around all sides of the roof work area at least 15 feet from the leading-edge but not more than 25 feet from the leading-edge. Note: Installation of HVAC equipment does not fall within the categories listed; *i.e.*, leading-edge work, pre-cast concrete erection or residential construction. Therefore, the warning line at the 6-foot option does not apply.
- (2) Points of access, materials handling areas, storage areas, and hoisting areas shall be connected to the work area by an access path formed by two warning lines.
- (3) 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, shall be placed across the path at the point where the path intersects the warning line erected around the work area, or the path shall be offset such that a person cannot walk directly into the work area.
- (4) Warning lines shall consist of ropes, wires, or chains and supporting stanchions erected as follows:
  - (a) The rope, wire, or chain shall be flagged at not more than 6-foot intervals with red pennants.
  - (b) The rope, wire, or chain shall be rigged and supported in such a way that its lowest point (including sag) is no less than 34 inches from the walking/working surface and its highest point is no more than 39 inches from the walking/working surface.
  - (c) After being erected, with the rope, wire, or chain attached, stanchions shall 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.
  - (d) The rope, wire, or chain shall have a minimum tensile strength of 500 pounds, and after being attached to the stanchions, shall be capable of supporting, without breaking, the loads applied to the stanchions as prescribed in paragraph the previous paragraph.

- (e) The line shall 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 the stanchion tips over.
- (5) No employee shall be allowed in the area between a roof edge and a warning line unless the employee is performing "roofing work" in that area.
- (6) Mechanical equipment on roofs shall be used or stored only in areas where employees are protected by a warning line system, guardrail system, or personal fall arrest system.
- c. **Controlled Access Zones.** Control zone systems shall comply with the following provisions:
  - (1) When workers must reach more than 10 inches below the level of their working surface, a controlled access zone may not be used as the fall protection measure.
  - (2) We realize that there cannot be any exposure to our workers to fall hazards such as holes, or hoist areas, within a controlled access zone. If there is, the workers must be protected by a fall protection means addressing the specific hazard.
  - (3) When used to control access to areas where leading edge and other operations are taking place the controlled access zone shall be defined by a control line or by any other means that restricts access.
  - (4) When control lines are used, they shall be erected not less than 15 feet nor more than 25 feet from the unprotected or leading edge, except when erecting precast concrete members.
  - (5) When erecting precast concrete members, the control line shall 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.
  - (6) The control line shall extend along the entire length of the unprotected or leading edge and shall be approximately parallel to the unprotected or leading edge.
  - (7) The control line shall be connected on each side to a guardrail system or wall.
  - (8) Control lines shall consist of ropes, wires, tapes, or equivalent materials, and supporting stanchions as follows:
    - (a) Each line shall be flagged or otherwise clearly marked at not more than 6-foot intervals with red or yellow pennant material.
    - (b) Each line shall be rigged and supported in such a way that its lowest point (including sag) is not less than 39 inches from the walking/working surface and its highest point is not more than 45 inches from the walking/working surface. When overhand bricklaying operations are being performed the highest point may not be more than 50 inches from the walking/working surface.
    - (c) Each line shall have a minimum breaking strength of 200 pounds.
  - (9) When used to control access to areas where overhand bricklaying and related work are taking place:
    - (a) The controlled access zone shall be defined by a control line erected not less than 10 feet nor more than 15 feet from the working edge.
    - (b) The control line shall extend for a distance sufficient for the controlled access zone to enclose all employees performing overhand bricklaying and related work at the working edge and shall be approximately parallel to the working edge.
    - (c) Additional control lines shall be erected at each end to enclose the controlled access zone.
    - (d) Only employees engaged in overhand bricklaying or related work shall be permitted in the controlled access zone.
    - (e) On floors and roofs where guardrail systems are not in place prior to the beginning of overhand bricklaying operations, controlled access zones shall 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 overhand bricklaying work or leading edge work to take place, only that portion of the guardrail necessary to accomplish that day's work shall be removed.
- d. Safety Monitoring Systems. A safety monitoring system means a fall protection system in which a competent person is responsible for recognizing and warning employees of fall hazards.
  - (1) The duties of the safety monitor are to:
    - (a) Warn by voice when approaching the open edge in an unsafe manner.
    - (b) Warn by voice if there is a dangerous situation developing which can not be seen by another person involved with product placement, such as a member getting out of control.
    - (c) Make the designated erectors aware they are in a dangerous area.
    - (d) Be competent in recognizing fall hazards.
    - (e) Warn employees when they appear to be unaware of a fall hazard or, are acting in an unsafe manner.
    - (f) Be on the same walking/working surface as the monitored employees and within visual sighting distance of the monitored employees.
    - (g) Be close enough to communicate orally with the employees.
    - (h) Not allow other responsibilities to encumber monitoring. If the safety monitor becomes too encumbered with other responsibilities, the monitor shall:
      - Stop the erection process.
      - Turn over other responsibilities to a designated erector.
      - Turn over the safety monitoring function to another designated competent person.
    - (i) The safety monitor shall monitor a maximum of 6 employees at any one time. If there are more than 6 employees in the area more safety monitors are required.
    - (j) Safety monitors will wear orange safety vests to identify themselves.
  - (2) The safety monitoring system shall not be used when the wind is strong enough to cause loads with large surface areas to swing out of radius, or result in loss of control of the load, or when weather conditions cause the walking-working surfaces to become icy or slippery.
- e. General requirements:
  - (1) Mechanical equipment shall not be used or stored in areas where safety monitoring systems are being used to monitor employees engaged in roofing operations on low-slope roofs.
  - (2) No employee, other than an employee engaged in roofing work on low-sloped roofs or an employee covered by a fall protection plan, shall be allowed in an area where an employee is being protected by a safety monitoring system.
  - (3) Each employee working in a controlled access zone shall be directed to comply promptly with fall hazard warnings from safety monitors.
  - (4) Covers for holes in floors, roofs, and other walking/working surfaces shall meet the following requirements:
    - (a) Covers located in roadways and vehicular aisles shall be capable of supporting, without failure, at least twice the maximum axle load of the largest vehicle expected to cross over the cover.
    - (b) All other covers shall be capable of supporting, without failure, at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time.
    - (c) All covers shall be secured when installed so as to prevent accidental displacement by the wind, equipment, or employees.

- (d) All covers shall be color coded or they shall be marked with the word "HOLE" or "COVER" to provide warning of the hazard. Note: This provision does not apply to cast iron manhole covers or steel grates used on streets or roadways.

8. Fall Protection Plan. This option is available **only** if it can be demonstrated that it is infeasible or it creates a greater hazard to use conventional fall protection equipment. The fall protection plan must conform to the following provisions.

- a. The fall protection plan shall be prepared by a qualified person and developed specifically for the site where the leading edge work, precast concrete work, or residential construction work is being performed and the plan must be maintained up to date. The plan must be approved by the Safety Director before it is implemented. Any changes to the fall protection plan shall be approved by a qualified person and the Safety Director.
- b. A copy of the fall protection plan with all approved changes shall be maintained at the job site.
- c. The implementation of the fall protection plan shall be under the supervision of a competent person.
- d. The fall protection plan shall document the reasons why the 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.
- e. The fall protection plan shall include a written discussion of other measures that will be taken to reduce or eliminate the fall hazard for workers who cannot be provided with protection from the conventional fall protection systems. For example, the Company shall discuss the extent to which scaffolds, ladders, or vehicle mounted work platforms can be used to provide a safer working surface and thereby reduce the hazard of falling.
- f. The fall protection plan shall identify each location where conventional fall protection methods cannot be used. These locations shall then be classified as controlled access zones and the Company must comply with the criteria in paragraph 6g of this section.
- g. Where no other alternative measure has been implemented, the Company shall implement a safety monitoring system in conformance with 1926.502(h).
- h. The fall protection plan must include a statement which provides the name or other method of identification for each employee who is designated to work in controlled access zones. No other employees may enter controlled access zones.
- i. In the event an employee falls, or some other related, serious incident occurs, (e.g., a near miss) the Company shall 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 shall implement those changes to prevent similar types of falls or incidents.

9. Training.

- a. The Company shall provide a training program for each employee who might be exposed to fall hazards. The program shall enable each employee to recognize the hazards of falling and shall train each employee in the procedures to be followed in order to minimize these hazards.
- b. The Company shall assure that each employee has been trained, as necessary, by a competent person qualified in the following areas:
  - (1) The nature of fall hazards in the work area.
  - (2) The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used.
  - (3) The 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) The role of each employee in the safety monitoring system when this system is used.
  - (5) The limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs.

- (6) The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection.
  - (7) The role of employees in fall protection plans.
  - (8) The standards contained in this subpart.
- c. Certification of training. Fall protection training presented to employees shall be documented using a written certification record. The written certification record shall contain the name or other identity of the employee trained, the date(s) of the training, and the signature of the person who conducted the training. Training certifications shall be maintained on file.
  - d. Re-training. When there is reason to believe that any affected employee who has already been trained does not have the understanding and skill required by paragraph 12a of this section, the Company shall retrain such employee. Circumstances where retraining is required include, but are not limited to, situations where:
    - (1) Changes in the workplace render previous training obsolete.
    - (2) Changes in the types of fall protection systems or equipment to be used render previous training obsolete.
    - (3) Inadequacies in an affected employee's knowledge or use of fall protection systems or equipment indicate that the employee has not retained the requisite understanding or skill.
10. Rescue. Employees will be provided with prompt rescue in the event of a fall. In cases where prompt rescue is not available employees will be provided and utilize fall protection equipment which enables them to perform self-rescue.

W. Fire Prevention & Protection.

- 1. Fire prevention and protection are safe work practices and procedures to help prevent fires from occurring, and to protect workers and property from unnecessary damage if a fire does occur.
- 2. General:
  - a. Smoke only in designated smoking areas.
  - b. Be familiar with all fire exits and fire alarms.
  - c. Remove combustible items from your work area frequently. Do not allow them to accumulate.
  - d. Dispose of oily, greasy or paint-soaked rags or towels in approved metal containers with self-closing lids.
  - e. Keep solvents and other flammable/combustible materials in approved, properly labeled containers, and store them away from hot work activity.
  - f. Keep ignition sources such as sparks, flames and excessive heat away from solvents and other flammable/combustible materials.
  - g. Erect welding screens if necessary to isolate combustible materials from sparks and hot slag.
  - h. Turn off internal combustion engines used to power vehicles, generators or other equipment before refueling.
  - i. Report fire hazards to your supervisor immediately.
  - j. Learn the address of the workplace and memorize landmarks that will help you guide emergency personnel to the fire.
  - k. Know how to quickly access emergency telephone numbers and the nearest telephone.
- 3. Fire Protection Equipment:
  - a. Make sure that firefighting equipment is easy to locate and readily accessible.
  - b. Make sure there is a Class ABC fire extinguisher is within 50 feet of any area where there is more than 5 gallons of a flammable/combustible liquid, more than 5 pounds of a flammable gas, or flammable material such as cardboard containers.
  - c. Make sure a suitable size (10-20 pound) Class ABC fire extinguisher is within 25 feet, and readily accessible, when welding, torch cutting, brazing, soldering, or grinding.
  - d. Water extinguishers may only be used for wood, paper, or cloth fires. They may not be used for liquid or electrical fires.
  - e. See the following for information on selecting the right extinguisher.

Fire Classifications			
A	B	C	K
Wood	Flammable Liquids	Electrical Equipment	Commercial Kitchens
Paper	Gases	Wiring	
Cloth	Solvents	Controls	
Rubber	Oil/Gasoline	Motors	
Trash	Paint	Data Processing Panels	
Plastics	Lacquers	Appliances	
	Tar		
	Synthetics		

Agent	Properties	Extinguishing Action	Clean-Up
<b>Multi-Purpose Dry Chemical</b>	Non-toxic Highly effective on all 3 classes of fire Absorbs some heat Mildly corrosive when moisture present Non-conductive	Breaks chain reaction of fire, also smothers & cools	Vacuum, sweep promptly, or scrub to avoid corrosion
<b>Regular Dry Chemical</b>	Non-toxic Effective on class B & C fires Non-corrosive Non-conductive	Breaks chain reaction of fire	Vacuum, sweep or flush with water
<b>Purple K Dry Chemical</b>	Superior to other dry chemicals in extinguishing class B fires Non-corrosive Non-conductive Non-toxic	Breaks chain reaction of fire	Vacuum, sweep or flush with water
<b>Carbon Dioxide</b>	Cooling agent Removes oxygen to starve fire Limited range Environmentally safe Leaves no residue	Smothers, cools	None required
<b>Wet Chemical</b>	Reduces temperature Cooling agent Extinguishes and reacts with cooking media to prevent reflash Designed for commercial kitchen application	Chemical Reaction, cooling	Wipe down
<b>Halotron</b>	Ozone friendly Vaporizing liquid Primarily a cooling agent Leaves no residue Clean alternative to halon 1211 EPA approved	Cool, quench, break chemical reaction	None required
<b>Water</b>	Remove heat from fire by cooling wets embers to prevent reigniting Long range capability Conductive Not for use with B or C fires	Cool, quench	Allow to dry
<b>Foam</b>	Cooling agent Floats on similar or flammable liquids to suppress vapors and help prevent reflash Easy to clean-up Non-toxic	Cool, smother, break chemical reaction	Wash down, let evaporate

4. Know when to not conduct hot work.
  - a. DO NOT conduct any hot work if available firefighting equipment will not successfully extinguish a fire that may be started. Examples:
    - (1) Brazing a refrigerant line for a condenser on a residential house or commercial building where the wall the line is passing through is made of wood or is insulated with flammable material. Brazing should not take place if the air space in the hole cannot be packed with welding blanket fabric (or other fire retardant material) to prevent torch flames from igniting interior wall material.
    - (2) Soldering a replacement mixing valve in a tub surround where an extinguisher will not reach behind the tub surround wall where a fire may start. In this case some type of access would need to be cut into the wall to allow firefighting equipment to reach where a fire may start. Wetting the mixing valve area with water alone will not provide enough protection. If an access panel cannot be cut the hot work should not take place.
5. In Case of Fire:
  - a. Warn others in the area about the fire.
  - b. Attempt to extinguish smaller fires with the proper fire extinguisher if safe to do so.
  - c. If the fire is large, sound the fire alarm immediately and evacuate the building or structure.
  - d. Call the fire department and give accurate directions to the fire.
  - e. Post someone to meet the fire department and direct them to the fire.
  - f. Turn off electrical power if safe to do so.

X. Flammable/Combustible Liquids and Materials.

1. Flammable/combustible materials are materials with low flash points that can easily ignite if exposed to an ignition source.
2. General:
  - a. Post "NO SMOKING" signs in service and refueling areas.
  - b. Store in approved containers with self-closing lids. Ensure they are properly labeled.
  - c. Transferring - Ground the drum first. Then, bond the drum and the container by attaching a conductive wire from the drum to the container.
  - d. Ensure connections on drums and pipe systems are airtight.
  - e. Never use flammable liquids within 50 feet of an ignition source.
  - f. Never store more than 25 gallons in a room outside of an approved storage cabinet, and never allow more than three storage cabinets in a single storage area.
3. Storage Cabinets:
  - a. Ensure only approved storage cabinets designed specifically for flammable/combustible liquid storage is used.
  - b. Ensure storage cabinets are labeled as follows: "FLAMMABLE - KEEP FIRE AWAY".
  - c. Check Material Safety Data Sheets (MSDS) to determine whether liquids are potentially flammable or combustible.
  - d. Ensure no more than 60 gallons of a flammable liquid or 120 gallons of a combustible liquid are stored in a single cabinet.
4. Inside Storage:
  - a. Do not smoke around flammable materials storage areas.
  - b. Post signs designating the area as a "NO SMOKING" area.
  - c. Before storing inside a building, make sure the building is fire resistant, has self-closing doors at all openings, and has at least 4-inch high sills or depressed floors. Ensure electrical wiring and equipment located in the same room is approved for flammable material storage areas.
  - d. Ensure the ventilation system is providing complete air exchanges at least 6 times an hour.
5. Outside Storage:
  - a. Ensure materials are stored to allow a 12-foot-wide access way for emergency fire control equipment.
  - b. Do not store materials near areas used for exits or near stairways.
  - c. Stack combustible materials in piles no more than 20 feet high.

- d. Make sure outdoor storage containers contain no more than 60 gallons of liquids and no more than 1,100 gallons are stored in any one area.
  - e. Ensure stacks of materials are separated by at least 5 feet and are stored at least 20 feet from a building.
  - f. Ensure outside storage areas for liquids are graded or diked so that a spill would be diverted away from the building.
  - g. Do not smoke in outside flammable/combustible storage areas.
6. Liquefied Petroleum (LP) Gas Storage:
- a. Ensure that "NO SMOKING" signs are displayed on LP storage tanks.
  - b. Turn off equipment before fueling.
  - c. Protect LP gas tanks from vehicular traffic.
  - d. Ensure that all electrical connections including pumps and switches are vapor and explosion proof.
- Y. Forklifts & Other Powered Industrial Trucks.
1. Forklifts and other powered industrial trucks are vehicles such as fork trucks, tractors, platform lift trucks, motorized hand trucks and other specialized industrial trucks that are powered by electric motors or internal combustion engines.
  2. General:
    - a. Be sure that you receive the proper training and are authorized by the Company to operate the forklift or other powered industrial truck. Refresher training is required every three years.
    - b. Always turn off the motor or engine before fueling or recharging the vehicle.
  3. Operation:
    - a. Never allow the load to obstruct your view.
    - b. Operate the *vehicle* only at safe speeds.
    - c. Start and stop slowly so the load will not shift.
    - d. Make your turns slowly, smoothly and gradually.
    - e. Adjust your speed and driving behavior based on the surface conditions.
    - f. If conditions are wet or muddy, slow down *even* more than you would on a dry surface, and allow more time and distance for stopping.
    - g. Maintain at least three vehicle lengths behind the vehicle ahead of you when the surface is dry. Increase this distance on wet or muddy surfaces.
    - h. Use the horn when approaching an intersection, blind spot or other potentially hazardous location.
    - i. In hazardous locations, mount mirrors on the jobsite to see pedestrians and oncoming traffic.
    - j. Never allow anyone to ride as a passenger on the vehicle.
    - k. Never raise or lower the load while the vehicle is moving.
    - l. Do not exceed the rated load capacity of the vehicle.
    - m. Watch constantly for overhead obstructions.
    - n. Keep well away from overhead power lines. Never use a vehicle as an elevator.
    - o. Always turn off the motor or engine if you intend to leave the seat and move more than 25 feet away from the vehicle.
    - p. Keep the vehicle headed straight up or straight down ramps. Never turn it sideways on an incline.
    - q. If you have to leave a vehicle on an incline, block or chock the wheels.
    - r. Always keep the load on the uphill side. Drive forward when going uphill and backwards when going downhill.
    - s. Never allow a vehicle with an internal combustion engine to operate or idle in an enclosed area.
    - t. Always drive with the load tilted back and the forks raised just enough to clear the load, but not more than absolutely necessary.
    - u. Tie or block round materials that could otherwise roll off.

- v. Transport compressed cylinders in specially designed racks to protect them and keep them upright.
- w. Never allow anyone under the elevated portion of a vehicle, even when there is no load.

Z. Grinding.

1. Grinding is the process of removing particles from an object with a powered, rotating abrasive wheel.
2. General:
  - a. Verify guards are in place on bench and stand grinders before using them.
  - b. Ensure that the adjustable work rest is in place on bench and stand grinders, and the rest adjustment does not exceed a clearance of 1/8-inch from the surface of the abrasive wheel.
  - c. Ensure that your portable grinder has guards in place unless the grinding wheel is 2 inches or less or is completely inside the work.
  - d. Ensure that the guards cover spindle ends, nuts and flange projections.
  - e. Make sure the guards are strong enough to withstand the force of a bursting abrasive wheel by using only those guards provided by the manufacturers.
  - f. Before mounting any abrasive wheel, inspect it carefully and ring test it to ensure that it is not defective.
  - g. Check that abrasive wheels are properly matched to the RPM rating of the grinder so the wheel or disk does not shatter.
  - h. **Always wear safety glasses and a face shield when grinding with abrasive discs and/or wire wheels.**
  - i. Turn off portable grinders and let the moving parts stop before putting the grinder down.

AA. Hand and Power Tools.

1. Hand and power tools are implements and machines used by workers to complete work tasks.
2. General:
  - a. Never bypass a tool manufacturer's safety guard or device.
  - b. Carefully follow the tool manufacturer's instructions for maintenance and tool repair.
  - c. Keep all tools clean and in good condition.
  - d. Carefully inspect all tools before using them.
  - e. If you see damage, immediately red tag the defective equipment and take it out of service. If the equipment cannot be removed ensure it is lock-out/tagged-out.
  - f. Use only the proper size and type of tool for each job.
  - g. Never use impact tools such as drift pins, wedges and chisels if they have mushroomed heads.
  - h. Employees using hand and power tools and exposed to the hazard of falling, flying, abrasive, and splashing objects, or exposed to harmful dust, fumes, mists vapors, or gases shall be provided with manufacturers' recommended PPE necessary to protect them from the hazard.
3. Power Tools:
  - a. Before servicing power tools, make sure to unplug or otherwise de-energize them.
  - b. Do not use electrical cords to raise or lower tools from one level to another.
  - c. Never yank on an electrical cord to unplug it. Grasp the plug and carefully remove it from the receptacle.
  - d. Ensure that point of operation guards are properly in place before using the tool.
  - e. Make sure your tools are properly grounded or double insulated before using them. To determine whether a tool is double insulated, look for the words "Double Insulated" or look for the double insulation symbol, which is a small square inside a larger square.
  - f. Check that the on/off switch is in the "off" position before plugging in any tool.
  - g. Carefully inspect the insulation on electrical cords, including extension cords and welding leads. If insulation is damaged, immediately follow your company's procedure for taking defective items out of service.
  - h. Use a ground fault circuit interrupter (GFCI) when operating power tools in damp locations.
  - i. Keep moving parts away from your body.
  - j. Ensure that your power tool is off and moving parts have stopped before putting it down.

**BB. Heating Devices (Temporary Heating Devices).**

1. Temporary heating devices are heaters used on jobsites to heat areas that are not equipped with permanent heating systems.
2. General:
  - a. Make sure that any area where a temporary heating device is being used has an adequate supply of fresh air.
  - b. Ensure that portable heaters fueled by LP gas are equipped with a device that automatically shuts off the gas flow if the flame fails.
  - c. Make sure that solid fuel salamanders are not being used inside buildings or on scaffolds.
  - d. Position temporary heating devices at least 10 feet away from combustible area covers, such as plastic tarps, canvas tarps or other flammable materials.
  - e. Securely fasten covers in place so they will not displace heaters and cause fires in high winds.

**CC. Hexavalent Chromium.**

1. Hexavalent chromium is a heavy metal component of stainless steel that can increase the risk of lung cancer if inhaled in significant concentrations. The major concern in the mechanical construction industry is worker overexposure to hexavalent chromium fumes created by welding or torch cutting on stainless steel pipe and ducts.

2. General:

- a. Get the proper training before working around hexavalent chromium.
- b. Check with your supervisor before you begin hot work on stainless steel to ensure that a hexavalent chromium exposure assessment has been completed.
- c. Use the ventilation that is provided and ensure it is working properly.
- d. Position your welding hood so welding fumes will not rise up under it.
- e. If respiratory protection is required, be sure you have the required training and proper respirator before starting work.

3. Industrial hygiene tests have been conducted on routine welding tasks involving stainless steel pipe. To date all tests have come back below permissible exposure levels (PELs). Any new work practices involving welding of stainless steel pipe will be reviewed to ensure hexavalent chromium PELs are not exceeded.

4. Employees exposed to known hexavalent chromium hazards will follow the Chromium (VI) program published separately. The purpose of this Chromium (VI) program is to help ensure that worker exposure levels to Chromium (VI) are accurately assessed, and that workers are not exposed to Chromium (VI) at levels that are above the Permissible Exposure Limit (PEL) (5 ug/m<sup>3</sup>). Where Chromium (VI) is present in concentrations above the PEL, the compliance procedures described in this program will be implemented. Where exposure levels are at or below the PEL, the applicable procedures described in this program will be implemented as required.

**DD. Hoists for Personnel & Materials.**

1. Hoists for personnel and materials are powered machines used to raise or lower personnel or materials from one level to another.
2. General:
  - a. Request a copy of the manufacturer's specifications and limitations, and follow them carefully.
  - b. Verify that recommended operating speeds, hazard warnings and any special instructions are posted on cars and platforms.
  - c. Ensure that material hoist entrances/exits are equipped with full-length gates or bars that are marked with contrasting colors, such as black and yellow stripes.
  - d. Make sure that personnel hoists have doors or gates that are no less than 6 feet 6 inches and are protected with mechanical locks that cannot be operated from the landing side. The locks should only be accessible to personnel on the car.
  - e. Check that overhead protective coverings have been provided on top of the personnel hoist cage or platform before you enter.

**EE. Hot Work.**

1. General.

- a. This program establishes the safe work practices to be used when performing Hot work. Hot work is defined as an open flame, welding arc, non-explosion proof electrical tools or equipment and any heat source capable of causing ignition. A properly executed Hot Work Permit will be present prior to beginning work when required.
  - b. Only employees that have been trained in safe operations of cutting and welding equipment may use such equipment. Employees that have successfully completed their craft certification test applicable to the use of cutting and welding equipment will be deemed qualified to use cutting equipment.
  - c. Operators will immediately report defective equipment and/or safety hazards and discontinue use of the equipment until all necessary repairs have been made. Only qualified personnel shall make repairs.
2. Definitions.
- a. Hot Work - Activity that produces a source of ignition (i.e., welding, burning/cutting, heating, brazing, lancing, etc.).
  - b. Critical Fire Area - Any area, operation, or process equipment where:
    - (1) Ordinary combustibles, flammable liquids, gases, dusts, oils, lubricants, etc. are in sufficient amount, concentration or arrangement that they may be ignited by Hot work; and
    - (2) Property value or business interruption potential is determined to be nt.
    - (3) A hot work permit is always required for hot work in a critical fire area.
    - (4) Sample of Critical Fire Areas:
      - (a) Dust Collection Systems
      - (b) Paint Rooms
      - (c) Fuel Storage Areas
      - (d) Hydraulic Oil Systems
      - (e) Flammable Process Materials
      - (f) Exhaust Systems of Flammables
      - (g) Woodworking Shops
      - (h) Battery Charging Areas
      - (i) Resin Silos
  - c. Non-Critical Fire Area - Any area, operation, or process where combustible loading and/or property value or business interruption potential is determined to be insignificant. A permit is not usually required for hot work in these areas (e.g., maintenance shop, outdoor grounds, etc.).
3. Procedures. Areas where welding or burning operations occur must be protected to prevent the ignition source from generating a fire. The following actions will be taken:
- a. Remove any flammable material or liquid from the area. (This includes aerosol cans).
  - b. Remove all combustibles. If they cannot be moved then they must be protected from sparks and slag. Contain sparks and slag with welding cloth.
  - c. Restrictions. If the requirements stated in paragraphs 2(a)(1) and 2(a)(2) above cannot be followed then welding and cutting shall not be performed.
  - d. Assign a fire watch as required. Ensure he/she is instructed on the anticipated fire hazards and knows how to operate the fire-fighting equipment.
  - e. Erect welding barriers and/or screens to protect other personnel from arc or flash burns.
  - f. Ensure a 20 pound, or larger, dry chemical fire extinguisher is located within 20 feet of any welding, burning, or flame work. Ensure the fire extinguisher has been inspected and is fully functional.
  - g. Keep hoses and leads out of walkways. Inspect all leads, grounds, clamps, welding machine hoses, gauges, torches and cylinders before use.
  - h. Avoid breathing fumes. Use exhaust systems, blowers, or respirators. No welding or burning is to be performed in a closed vessel or tank until it has been decontaminated.
  - i. Before applying heat to drums, containers, or hollow structures, a vent or opening shall be supplied to prevent pressure build-up.

- j. Remove toxic preservative coatings a sufficient distance from the welding area to ensure the heated area does not raise the temperature of the coating as to allow it to escape into the atmosphere.
  - k. A fire watch will be required when hot work is to be performed on the following:
    - (1) In locations where other than a minor fire may develop.
    - (2) Where combustible material is stored within 35 feet of hot work.
    - (3) When combustibles are greater than 35 feet away but are easily ignited.
    - (4) Adjacent to wall or floor openings within a 35 foot radius of combustible material.
    - (5) When combustible materials are adjacent to the opposite side of metal partitions, ceiling or roofs.
    - (6) A fire watch shall be maintained at least a half an hour after the welding or cutting operation was completed.
  - l. A first aid kit shall be made available at all times.
4. Welding - Electric Source:
- a. All work must have an adequate ground.
  - b. Welding rods will be removed from the electrode holder when not in use.
  - c. Place used welding rod stubs in metal containers.
  - d. Turn off all machines when not in use.
  - e. An approved welding helmet must be worn. It shall be equipped with at least a number 10 filter plate. The filter plate shall have safety plates on both sides of it.
  - f. Never perform electric welding from a metal ladder.
  - g. Welders performing gas shielded arc welding must be familiar with the American Welding Society Standard A6-1-1966.
5. Welding - Engine Source:
- a. Perform preventative maintenance checks and services on the unit. Ensure all fluids are full.
  - b. Remove any excess gas or oil containers from the welder.
  - c. Chock the trailer wheels.
  - d. Ensure engine exhaust does not interfere with sensitive living or office spaces.
  - e. Ensure a properly serviced fire extinguisher of ten pounds or more is located 25-50 feet from the unit.
  - f. Keep welding leads to a minimum and clear of vehicle and pedestrian traffic.
6. Burning - Gas Source:
- a. Workers in charge of oxygen or fuel-gas supply equipment (including distribution piping systems and generators) must be instructed and judged competent for such work.
  - b. Before connecting regulators ensure the cylinder valves are clean and functioning.
  - c. Open valves on fuel gas cylinders (propane, acetylene, natural gas) a quarter turn only. Open oxygen valves completely. Keep valve wrenches in place during use.
  - d. When using acetylene, do not exceed 15 psi on the torch side of the gauge.
  - e. When lighting a torch, open the fuel gas valve first then the oxygen. Use an approved spark lighter only.
  - f. All compressed gas cylinders should be kept in bottle-carts.
  - g. Break down all burning rigs at the end of each shift. Remove regulators and install protective caps.
  - h. Secure compressed-gas cylinders in a vertical position during use, storage, and transportation.
  - i. Keep oil and grease away from oxygen-regulator hose and fittings. Do not store grease-covered tools in the same compartment with oxygen equipment. Oxygen cylinders shall be stored in an upright secured position 20 feet from any flammable gases or petroleum products
  - j. Do not use compressed gas to clean clothing, blow out anchor holes, or clean areas.
  - k. Inspect all hoses, gauges and torches regularly.
  - l. Wear approved burning glasses with at least a number four filter with safety lens on both sides of it.
  - m. Because of potential leakage, never leave a torch in a vessel, tank, or other closed container.

- n. Never use oxygen in pneumatic tools to pressurize a container, to blow out lines, or as a substitute for compressed air or other gases.
  - o. Place cylinders and hoses where they are not exposed to sparks or slag.
  - p. Handle cylinders as follows:
    - (1) Lift to upper levels with approved cages only.
    - (2) Do not strike an arc on cylinders.
    - (3) Do not use cylinders as rollers.
    - (4) Do not lift with slings or by the protective cap.
    - (5) Anti-flash back arrestors shall be installed on all fuel gas cylinders or built into the regulators.
7. Inert-gas metal-arc welding. Because of the ultra-violet radiation intensities chlorinated solvents are susceptible to decomposition. As a result toxic fumes and gasses can be released. The following special precautions must be taken:
- a. Workers assigned to operate arc welding equipment must be properly instructed and qualified to operate such equipment. Furthermore they will be trained in the following:
    - (1) Fire prevention and protection.
    - (2) Protection of personnel; including fall protection and use of personal protective equipment.
    - (3) Health protection and ventilation.
  - b. Chlorinated solvents must be moved at least 200 feet away unless properly shielded from the arc.
  - c. Surfaces prepared with chlorinated solvents shall be thoroughly dry before welding on such surfaces.
  - d. Employees in the area must be protected by screening or the appropriate filter lens. When two or more welders are exposed to each other's arc they must also wear goggles under their hoods with the appropriate filter lens. Hand shields must be used when they lift their hood.
  - e. Employees must protect all exposed skin using suitable clothing or shields.
  - f. When welding stainless steel proper ventilation must be provided to protect against the build-up of dangerous concentrations of nitrogen dioxide.
  - g. Equipment maintenance. Operators of equipment are to report any equipment defect or safety hazards and discontinue use of equipment until its safety has been assured. Repairs shall be made only by qualified personnel.
8. Personal Protective Equipment.
- a. Protective clothing required for welding and burning varies with the size, nature, and location of the Hot work. The following considerations should be taken:
    - (1) Only fire resistant clothing should be worn.
    - (2) All welders shall use flameproof gloves.
    - (3) Clothes should be free from oil and grease.
    - (4) Flameproof leather aprons should be used if long-term exposure to radiant heat or sparks is anticipated.
    - (5) Welders should cover all exposed skin.
    - (6) Welding assistants working within six (6) feet of a welder will:
      - (a) Wear the same protective clothing. As a minimum, use eye protection that blocks UVA, B, and C radiation and 85% of infrared (IR) radiation which is equivalent to a Shade 2.0 welding filter.
      - (b) Never look at the welder's arc.
9. Respiratory Protection.
- a. Proper ventilation and or respiratory protection will be provided whenever there is a potential for the build-up of hazardous fumes or vapors from burning, cutting, or welding of:
    - (1) Beryllium-containing base or filler materials.
    - (2) Cadmium-bearing filler materials.
    - (3) Chromium-bearing filler materials or coated with chromium-bearing materials.
    - (4) Lead base materials.

- (5) Mercury-bearing materials.
    - (6) Zinc-bearing base, fillers, or coated materials.
  - b. Welding surfaces covered with toxic preservative coatings require the coatings be removed at least 4 inches from the welding spot or area of heat application, or employees shall use air line respirators in confined spaces or respirators in open spaces.
- 10. Permit Procedures.
  - a. Supervisors involved with hot work will:
    - (1) Review the scope of other workers in the area that the hot work will affect.
    - (2) Assure that a permit has been issued in critical fire areas. If a supervisor is uncertain whether or not a hazardous condition exists, a permit should be issued.
    - (3) It is a supervisor's responsibility to ensure that fire or health hazards which may develop during the course of Hot work activity does not result in the work area changing from non-critical to critical (i.e., toxic or explosive vapors may develop as a result of the Hot work). Should this occur, the responsible supervisor must notify all concerned and work shall not continue until a new or revised permit has been issued.
    - (4) Upon completion of the hot work notify the individual who issued the permit and ensure that a final inspection is conducted and the area declared "fire safe" prior to removal of the permit from the work area. This final inspection should be made approximately 30 minutes after completion of the hot work.
  - b. Individual responsible for issuing a hot work permit will:
    - (1) Visually inspect the proposed work area.
    - (2) Record all potential fire and safety hazards observed.
    - (3) Determine whether toxic and/or explosive vapors, fumes, dusts, etc., are present in a quantity sufficient to create a fire or safety hazard. Where entry into a confined space is involved, refer to appropriate confined space procedures.
    - (4) Specify measures required to control potential hazards and review these requirements with person(s) requesting the permit.
    - (5) After the necessary requirements have been met; sign, date and post the permit in or near the work area.
    - (6) The Hot work permit shall be valid for one work shift. At the start of a new work period, the area will be re-evaluated and a new permit will be issued and posted.
    - (7) Conduct a final inspection of the area approximately 30 minutes after completion of the work. When the area is considered "fire safe", remove the permit form.
    - (8) Forward completed permits to the Safety Manager where they will be retained for 12 months for review by insurance, regulatory agency or other authorized persons.
  - c. Non-Company hot work permits.
    - (1) Performing hot work for another contractor may require their hot work permits be utilized. If this is true both theirs and the Company's will be completed.
    - (2) When subcontractors perform hot work for the Company they will be required to follow the Company's hot work policy as a minimum and complete the Company's hot work permit.
- 11. Training.
  - a. The hot work permit system will be reviewed with all supervisors periodically.
  - b. Cutters, welders and their supervisors must be suitably trained in the safe operations of their equipment and the safe use of the process.



**Table 8 Foot-Candle Requirements**

Foot-Candles	Construction Area
5	General construction area lighting
3	General construction areas, concrete placement, excavation and waste areas, access ways, active storage areas, loading platforms, refueling and field maintenance areas
5	Indoors: warehouses, corridors, hallways and exit ways
5	Tunnels, shafts and general underground work areas
10	General construction plant and shops (e.g., batch plants, screening plants, mechanical and electrical equipment rooms, carpenter shops, rigging lofts and active storerooms, barracks or living quarters, locker or dressing rooms, mess halls, and indoor toilets and workrooms)
30	First aid stations, infirmaries and offices

**HH. Ladders.**

1. Ladders are specially designed equipment used by workers to safely reach overhead work areas that cannot be accessed from the walking/working level.
2. General:
  - a. Participate in ladder safety training before using any ladder.
  - b. Carefully inspect each ladder before use. Ensure rungs are uniformly spaced.
  - c. If you discover any defects, do not use it. Immediately red-tag and remove it from service. Coordinate the return of the ladder to your company for repair by a competent person.
  - d. Never exceed the ladder's maximum load capacity.
  - e. Always face the ladder when climbing up or down, and maintain a constant three-point contact (e.g., two hands and one foot or two feet and one hand on the ladder at all times).
  - f. Never carry tools, materials or equipment in your hands when climbing up or down a ladder. Wear a tool belt or use a small hand line to raise or lower tools and equipment.
  - g. Never reach out too far from a ladder. Get down and move it so you won't have to reach too far.
  - h. Make sure that all ladders are used only for their intended purpose.
  - i. Make sure that there is a ladder or stairway any place there is a break in elevation of 19 inches or more, unless there is another suitable means of access available.
  - j. Use ladders with non-conductive side rails, especially when working near sources of electricity.
  - k. Do not let ladders contact overhead power lines. Keep at least three feet from electrical lines pushing 480 volts or less and keep at least 10 feet away from lines pushing 50,000 volts or less.
  - l. Do not use excessively painted ladders as paint can hide defects.
  - m. Ensure all manufacture's safety labels are legible.
  - n. Protect ladders in doorways and passageways so they will not get bumped or knocked over.
3. Portable Straight Ladders:
  - a. Set straight ladders on a firm, level and substantial base.
  - b. Secure the ladders in place.
  - c. In addition to securing the ladders, use slip-resistant feet on slippery surfaces.
  - d. Ensure that the base (foot) is pitched out from the vertical plane of its top support 1/4th the length of the ladder, measured from the ground at the foot of the ladder to the top support (i.e. set it at a 4 to 1 angle).
  - e. When using a ladder to access an upper level, make sure that it extends at least 3 feet above the landing surface.
  - f. Never climb higher than the third rung from the top of a straight ladder.
4. Portable Stepladders:
  - a. Fully open stepladders and lock them in the open position before using them.
  - b. Never use a stepladder as a straight ladder.

- c. Never stand or sit on the top two steps.

II. Lasers.

1. Lasers are tools that generate visible radiation used for leveling, measuring and other functions.
2. General:
  - a. Get the proper training before working with or around lasers.
  - b. Wear the proper anti-laser eye protection whenever you could be exposed to direct or reflected laser light.
  - c. Turn off or block laser beams with beam shutters or caps when the laser is not being used.
  - d. Post "Caution – Laser in Use" warning signs when other workers are in the area.

JJ. Lead.

1. Lead is a heavy metal that can cause serious health problems if inhaled in significant concentrations. It is a cumulative poison that can stay in the human body for decades. Lead can cause chronic health problems such as birth defects and reproductive system damage, seizures, coma and death. Most lead exposure in the mechanical construction industry comes from soldering, servicing ductwork, and welding, flame-torch cutting, or grinding on surfaces painted with lead-based paint.
2. General:
  - a. Get the proper training before working around lead.
  - b. Learn to identify lead-emitting activities.
  - c. Request a copy of your company's lead compliance program and follow it carefully.
  - d. Use any feasible method available to eliminate lead fumes and keep lead dust from becoming airborne.
  - e. Use the ventilation that is provided for you, and make sure it is working properly.
  - f. If respiratory protection is required, get the proper training and the proper respirator before starting work.
  - g. Do not grind lead paint. Only chemical peels or grinders with built-in HEAP vacuum filters may be used. Even then anyone removing lead must first be trained and certified to do so.

KK. Leak Testing (Pressure Testing).

1. General. This section applies to testing building services piping in accordance with ASME B31.9-2008 *Building Services Piping*. For other ASME code testing requirements and procedures see the Company Quality Control Manager.
  - a. Prior to initial operation, each piping system shall be tested for leakage.
  - b. Local building codes will be observed and adhered to when its requirements are more stringent than those set forth in this section.
  - c. Hydrostatic testing shall be employed when possible.
  - d. Since testing with compressed gas poses the risk of sudden release of stored energy, pneumatic testing shall be used within the following limitations:
    - (1) The piping system does not contain cast iron pipe or plastic pipe subject to brittle failure (such as PVC) (see paragraph 1 d (6) below);
    - (2) The system does not contain soldered or solvent cement joints over NPS 2 (nominal pipe size of 2 inches) (see paragraph 1 d (6) below);
    - (3) The test pressure does not exceed 150 psig;
    - (4) The system will be used in gas service, or for other reasons cannot be filled with water;
    - (5) Traces of a test liquid would be detrimental to the intended use of the piping.
    - (6) **NOTE:** A preliminary test of **not more than 10 psig** compressed gas can be applied to reveal possible major leaks. The preliminary test of 10 psig or less is not subject to the limitations of paragraph (1) through (5) above.
  - e. Pre-test preparations listed in paragraph 2 below will be followed for both hydrostatic and pneumatic testing.

- f. When testing with pressure a Job Hazard Analysis (JHA) will be developed that meets site specific conditions and approved by the Company's Project Manager and Senior Site Foreman. All personnel involved with the test will be briefed on the JHA and its requirements. Employees will not deviate from the developed JHA, the procedures listed in this section, and the directions of their supervisors. If a safety concern arises employees will immediately notify their supervisor.
  - g. The Leak Test Report, located at the end of this manual, will be used to document the pressure test unless a GC/CM or Owner has a requirement to use another form.
2. Pre-Test Preparation - Hydrostatic and Pneumatic.
- a. Establish test parameters (hydrostatic or pneumatic, duration, test pressure, temperature).
  - b. Remove, disconnect, or otherwise isolate equipment that is not to be subjected to the test pressure. Valves used to isolate the equipment shall be capable of sealing against the test pressure without damage. Flanged joints at which blinds are inserted to isolate equipment need not be tested.
  - c. Pressure gauges shall have maximum dial readings of twice the pressure when possible. At minimum the dial readings shall be from 1 ½ to 4 times the test pressure. The gauge shall be installed so that it is visible to the operator controlling the pressure. Account for initial gauge reading (system filled at atmospheric pressure) when determining required gauge reading at test pressure.
  - d. Walk the system down to verify that safety valves are set and test boundaries are secure.
  - e. All joints including welds shall be left un-insulated and exposed for examination during the test.
  - f. Expansion joints that cannot sustain the reactions due to test pressure shall be provided with temporary restraint, or they may be isolated from testing.
  - g. If the test pressure is to be maintained for a period of time during which the test fluid is subject to thermal expansion or, any other source of over-pressurizing during the test, precautions such as the installation of a relief device shall be taken to avoid excessive pressure.
  - h. Barricade test area off and place signage restricting access to only authorized personnel.
  - i. Personnel authorized in the test area must be wearing all appropriate Personal Protective Equipment (PPE) which at a minimum consists of hard hat, safety glasses, and appropriate hand protection. When pneumatic pressure is used hearing protection will also be required.
  - j. All valves used to isolate the piping system will have appropriate lock-out/tag-out applied to prevent unauthorized operation.
  - k. Only mechanical devices such as gate or ball valves shall be used to control the incremental pressure increases and releases. The opening or "breaking" of flanges or grooved pipe couplings shall never be used as a means of depressurizing a system.
3. Hydrostatic Testing.
- a. Ensure pre-test preparation steps listed in paragraph 2 have been accomplished.
  - b. Water at ambient temperature shall be used as the test medium except where there is risk of damage due to freezing. Another liquid may be used if it is safe for workers and compatible with the piping.
  - c. Vents shall be provided at high points in the system to release trapped air while filling the system. Drains shall be provided at low points for complete removal of the test liquid.
  - d. The system shall be examined to see that all equipment and parts that cannot withstand the test pressure are properly isolated. Test equipment shall be examined to ensure that it is tight and that low pressure filling lines are disconnected.
  - e. Hydrostatic test pressure.
    - (1) **Minimum pressure.** The piping system shall be subjected to a hydrostatic test pressure which at every point in the system is not less than 1.5 times the design pressure.

- (2) **Maximum pressure.** The test pressure shall not exceed the maximum test pressure for any vessel, pump, valve, or other component in the system under test. A check shall be made to verify that the stress due to pressure at the bottom of vertical runs does not exceed 90% of specified minimum yield strength.
  - f. Fill the pipe system.
    - (1) Ensure that vents are open and drains closed.
    - (2) Slowly fill system with test liquid until all air is removed. Do not fill faster than vents can handle or else air may be trapped in the system.
    - (3) Let the system stand until entrapped air has risen to vents and temperatures of material and test liquid have equalized.
    - (4) Re-vent and top of the system with test liquid and close vents.
    - (5) Flag off an appropriate test area to prevent unauthorized entry.
  - g. Apply pressure.
    - (1) Pressure shall be applied in 25% increments with at least five minutes between increments to allow the stress on the piping system to equalize. During pressurization the pipe system will be walked to check for leaks and to monitor pipe supports, guides, and hangers for proper operation.
    - (2) Maintain the required test pressure for a minimum of ten minutes or as required by local inspectors.
    - (3) Decrease the pressure to the designed pressure long enough to check for leaks by examining all joints and connections. During the examination record the times, pressures and temperatures as required.
    - (4) If leaks are found:
      - (a) Leaks shall be marked when discovered.
      - (b) Pressure shall be relieved after the leak check is completed and/or prior to any attempt to make an adjustment on a flange, valve, coupling, etc.
      - (c) **For grooved pipe system leaks the pressure shall be safely reduced to zero psig before any attempt to adjust or tighten a coupling is made.**
      - (d) **Leaking couplings will be dismantled, gaskets visually inspected, and roll grooves re-measured for tolerance.**
      - (e) Leaking compression type fittings that have been crimped already will be removed and replaced with a new fitting. They will not be re-crimped!
    - (5) After leaks are repaired, the system shall be retested.
    - (6) At test completion, slowly open vents until pressure is relieved, then open vents fully before draining the system. Always drain to approved drainage systems or containers. Ensure any water spilled on floors during draining or leaks is immediately picked up to prevent slips.
4. Pneumatic Testing.
- a. Ensure pre-test preparation steps listed in paragraph 2 have been accomplished.
  - b. Test Medium.
    - (1) Test medium shall be an oil-free nonflammable and nontoxic gas.
    - (2) When using gases other than air caution shall be used when ventilating the piping system to ensure occupied areas do not become oxygen deficient.
  - c. Preliminary Test. To reveal possible major leaks a preliminary test of not more than 10 psig shall be applied prior to application of full pneumatic test pressure.
  - d. Pneumatic Test Pressure.
    - (1) Test pressure shall not exceed 1.25 times the design pressure.
    - (2) Pressure shall be applied in several stages, allowing time for the system to reach equilibrium at each stage.
    - (3) Test pressure shall not exceed the maximum allowable pneumatic test pressure for any vessel, pump, valve, or other component in the system under test.
  - e. Examination for leakage.

- (1) After preliminary test pressure, pressure shall be raised in stages not more than 25% up to full pneumatic test pressure, allowing time for equalization of strains and detection of major leaks at each stage.
  - (2) Following the application of test pressure for at least 10 minutes, the pressure may be reduced to design pressure and examination shall be made for leakage of the piping.
  - (3) Leaks may be detected by soap bubble, halogen gas, scented gas, test gauge monitoring, or ultrasonic.
  - (4) **If leaks are found:**
    - (a) **Pressure shall be safely reduced to zero psig before any attempt to adjust or tighten any couplings, valves, piping components, etc.**
    - (b) **Leaking couplings will be dismantled, gaskets visually inspected, and roll grooves re-measured for tolerance.**
    - (c) Leaking compression type fittings that have been crimped already will be removed and replaced with a new fitting. They will not be re-crimped!
  - (5) Once the appropriate repair or adjustment has been made the pneumatic test will be repeated until no leaks are found.
5. Initial In Service Leak Test.
- a. General. It is permissible to conduct the in service system testing with the service fluid for:
    - (1) Gasses, steam, and condensate service not over 15 psig, and;
    - (2) Nontoxic, noncombustible, nonflammable liquids at pressures not over 100 psig and temperatures not over 200°F.
  - b. In Service Testing.
    - (1) A preliminary test with air at 10 psig or less will be used to check for major leaks.
    - (2) The piping system shall then be brought up to operating pressure gradually with visual examination at a pressure between one-half and two-thirds of operating pressure.
    - (3) A final examination shall be made at operating pressure.
    - (4) If the piping system is free of leaks it meets ASME B31.9 pressure testing standards.
6. Post-Test Procedures.
- a. Ensure system is at zero psig.
  - b. Re-connect and reinstall equipment which was removed for the test.
  - c. Remove test blinds.
  - d. Remove temporary vents and drains and close any openings.
  - e. Walk down system and verify restoration.
  - f. Remove warning signs and/or barricades.
  - g. File leak test report (see Figure 18 Leak Test Report located at the end of this manual).

LL. Liquefied Petroleum (LP) Gas.

1. LP gas is a mixture of gases that change into liquid under moderate pressure. In the mechanical construction industry, it is used to fuel temporary heaters and other equipment.
2. General:
  - a. Check containers, valves, connectors, manifold valve assemblies and regulators to ensure they are the proper system components.
  - b. Make sure that each container and vaporizer has approved safety relief valves.
  - c. Verify that LP gas cylinders have an excess flow valve to minimize the flow of gas if the fuel line becomes ruptured.
  - d. Never store LP gas inside buildings.
  - e. Make sure there is a serviceable Class ABC fire extinguisher readily accessible wherever LP gas is stored.

MM. Lockout/Tagout.

1. Definitions.

- a. Affected Employee. Any employee whose assigned job or task requires him/her to operate or use a machine/equipment/system on which servicing, testing, or maintenance is being performed under lockout/tagout, or one who is working in the area where such servicing, testing, or maintenance is being performed.
  - b. Authorized Employee. The person(s) who locks/tags out machines, equipment, circuits, or systems in order to allow servicing or maintenance on that system, and one who has been trained in accordance with this Section. The authorized employee is typically the controlling supervisor or Foreman responsible for overseeing any operation where the potential release of hazardous energy may occur.
  - c. Hazardous Energy. Energy, in any form, that when released in an uncontrolled or unexpected manner has the potential to cause injury or property damage. Hazardous energy forms include electrical, fluid systems (water, coolant, process chemicals, etc.), pneumatic, gaseous, thermal, and gravity (e.g. raised loader bucket).
  - d. Isolating Device. Any device that physically blocks or stops the flow of hazardous energy. Isolating devices include breakers, valves, piping blanks/blinders, key switches, lever arms, etc.
  - e. Lockout Device. Any device that, when installed over an isolating device or as an integral block/blank in a piping system, positively restricts the isolating device from being energized or activated.
  - f. Zero Energy. The state of a machine, equipment, circuit, or system where lockout/tagout has been performed and where there is no possibility of hazardous energy release.
2. General Requirements.
- a. Employees involved in an operation requiring lockout/tagout must possess the knowledge and skill required to perform the duties for which they are assigned.
  - b. At a minimum, all employees shall be trained in accordance with the requirements of this section. Training shall include recognition of potential energy release sources, avoidance of energy release hazards, recognition of unsafe conditions that could potentially lead to the release of energy, types of lockout/tagout methods used for the operation, roles and responsibilities for affected and authorized employees, correct procedures for locking and tagging energized equipment/systems, and correct procedures for re-energizing systems and notifications. Retraining is required when there is a change in job assignments, in machines, a change in the energy control procedures, or a new hazard is introduced. All training and/or retraining must be documented, signed and certified
  - c. Locks used to lock out energized machines/equipment/systems shall be keyed differently, and only one key shall exist for each lock. The key used to lock out equipment shall remain in the possession or under the control (i.e. in a key lock box) of the authorized employee until the system is re-energized.
  - d. Tags used to identify locked machines/equipment/systems shall be 'Danger'-type tags, and shall include the date, the name and phone number of the authorized employee, and the reason for the lock out.
  - e. Service on corded tools and equipment will be deemed to be in compliance if the cord is unplugged and is in the possession of the person conducting the servicing.
  - f. Where work on energized systems is required and necessary, the requirements outlined in section titled **Energized Electrical Work** shall be adhered to. NOTE: It is assumed that it is feasible and practical to isolate, lock, and tag all hazardous energy sources, except those instances where continuity of service is essential to life and health.
  - g. Prior coordination shall be obtained from facility owners/managers where isolation or lockout/tagout of the owner's equipment or systems is required.
3. Lockout/Tagout Procedures (Minimum Requirement).
- a. Achieve Zero Energy:
  - b. Identify and locate all sources of energy that could affect individuals involved.
  - c. The authorized employee shall notify all affected personnel that the equipment is going to be de-energized and accessed.

- d. Isolate and disconnect the main source(s) of power by breaking the primary power circuit/valve/pipe, etc. NOTE: For electrical disconnects, ensure that all loads are shed from the circuit prior to de-energizing.
  - e. Isolate and disconnect each separate power source of multiple power systems (e.g. pneumatic over hydraulic, electric over fluid, etc.)
  - f. Release all residual energy remaining behind the power source (e.g. pneumatic, fluid, hydraulic, electrical capacitor, batteries, springs, etc.)
  - g. The authorized employee (controlling supervisor) shall secure all power sources in the de-energized position with the proper lockout device (e.g. lock, circuit breaker hasp and lock, valve hasp and lock, etc.). Multiple locks will be required when more than one trade or group must work on the same de-energized system. NOTE: All affected employees have the right to place his/her lock on any de-energized system that he/she is required to work on.
  - h. Each person who is protected by the lockout, or the authorized person, shall place a lock and tag on the source location.
  - i. The person performing the lockout shall remain in possession of the sole key for that lock, and shall only work on the de-energized/protected equipment. The lock can only be removed by the individual that performed the lockout, and only at the completion of the work (as noted below).
  - j. Test the equipment, prior to working on it, to ensure that all sources of energy have been isolated. This can be accomplished by attempting to energize the unit/system downstream of the isolating lock (i.e. at the unit), by electrically testing any circuits downstream, attempting to produce gas/water/steam flow in a line downstream of the isolating lock, etc. No systems should be worked upon until positive recognition of a 'zero energy state' is attained.
4. Re-Energizing the system.
- a. Once the task has been completed, the authorized employee shall ensure that all tools have been picked up/removed, all safety chains, guards, guardrails, warning signs, etc., have been re-installed, and all repairs have been made appropriately.
  - b. The authorized employee shall notify all affected persons that the lockout/tagout device is going to be removed.
  - c. The authorized employee shall remove the lock and tag only after the above items 1 and 2 have been completed.
  - d. Restart the equipment and inspect for proper function.
5. Temporary Operation of a Locked Out Source.
- a. The authorized employee shall inspect the work area to ensure that all personnel, tools, etc. are clear of the system.
  - b. The authorized employee shall notify all affected employees of the forthcoming system temporary energizing ('system bump').
  - c. The authorized employee shall remove the lock from the system.
  - d. The authorized employee shall energize the system and conduct the 'bump' or system check.
  - e. The authorized employee shall immediately de-energize the system and replace the locks/tags.
  - f. Inform all affected employees of the de-energized system.
6. Periodic inspections of the energy control procedure must be conducted at least annually to ensure that the procedure is being followed. The Shop Foreman or Safety Director shall perform the inspection. A certified review of the inspection including date, equipment, employees & the inspector should be documented.

#### NN. Materials Handling and Storing.

- 1. Materials handling and storing is the process of lifting, moving, carrying, placing and storing construction materials and equipment.
- 2. Before manual lifting is performed, a hazard assessment must be completed. The assessment must consider size, bulk, and weight of the object(s), if mechanical lifting equipment is required, if two-man lift is required, whether vision is obscured while carrying and the walking surface and path where the object is to be carried.

3. General:

- a. Coordinate to have materials mechanically delivered as close to the work area as possible.
- b. Always inspect handling equipment before use each day. If you find defective equipment immediately red-tag and remove it from service. Coordinate with your warehouse to have a competent person perform repairs.
- c. Check the load capacities, operating speeds and other instructions before using equipment.
- d. Never stand or work under a suspended load.
- e. Never ride on a hoist or conveyor not specifically designed to carry people.
- f. Use materials moving equipment such as pipe racks and dollies whenever possible. When you cannot use materials moving equipment, make sure to use proper manual lifting techniques.
- g. Where use of lifting equipment is impractical or not possible, two man lifts should be used for objects weighing more than 50 pounds or objects that are long, awkward, or in hard to reach places.
- h. Manual Lifting Techniques:
  - (1) Start by getting your body as close as possible to the object.
  - (2) Position your feet and get a good grip on the object.
  - (3) Keep your butt down and your head up to retain the natural curves of your back.
  - (4) Lift straight up with a slow, steady movement, letting your legs do the work.
  - (5) Never twist or turn your torso with your feet planted.
  - (6) When you turn, move your feet and body without twisting.
  - (7) When placing an object reverse the order, remembering to keep your butt down and your head up.
  - (8) See **Figure 12 – Proper Lifting Technique** below.

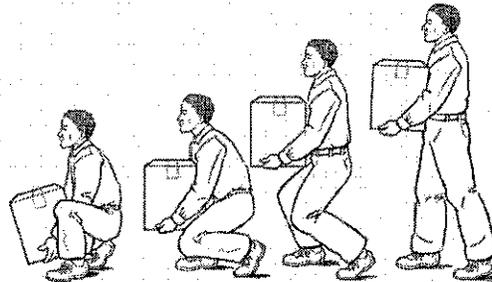


Figure 12 Proper Lifting Technique

4. Materials Storage:

- a. Make sure that all materials stored in tiers are secured to prevent sliding, falling or collapse.
- b. Never store materials in passageways or aisles, or where they could obstruct exits.
- c. Don't stack materials so high that they could fall.
- d. Ensure that pipe that is not on a rack is stacked and blocked so it won't spread.
- e. Never place materials within 6 feet of any hoist areas or floor opening, or within 10 feet of an unfinished exterior wall inside unfinished buildings.
- f. Store materials safely based on their flammability and/or combustibility characteristics.
- g. Avoid sudden load shifts while un-banding material.

5. Lifting Material with Manual Hoist Equipment.

- a. Always follow the manufacturer's instructions when using manual hoisting equipments such as Genie lifts, Hi-Jacks, and Roust-A-Bouts. See **Figure 13 – Genie lift, Hi-Jack, and Roust-A-Bout Lift**.
- b. Employees who have never used this type of equipment must be trained by a competent person before attempting to use it themselves.
- c. Never over-load hoist equipment.
- d. Always inspect the hoist prior to each use. If damage or deficiencies are found red-tag the equipment and remove it from service until it can be properly repaired.

- e. Never modify the equipment unless it is approved by the manufacturer.
- f. Inspect the floor for holes and dips that may cause the lift to tip when raised.
- g. Keep everyone from underneath the load while lifting. Erect red danger tape when appropriate to keep other workers out of the immediate lift area. If the public has access to the area erect hard barricades or keep someone physically on guard to ensure they cannot walk below or near the load during lifting and securing.
- h. **Never leave a load unattended while in a raised position!**

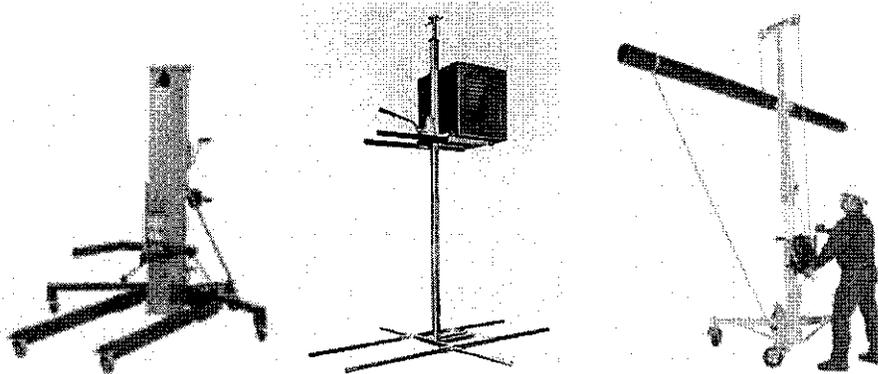


Figure 13 Genie lift, Hi-Jack, and Roust-A-Bout Lift

- 6. Training. Personnel performing manual lifting should be trained in the general principles of ergonomics, recognition of hazards and injuries, procedures for reporting hazardous conditions, and methods and procedures for early reporting of injuries. MCAA's DVD *The Smart Move: Manual Handling of Materials* will be reviewed. Additionally, job specific training should be given on safe lifting and work practices, hazards, and controls.
- 7. Musculoskeletal injuries caused by improper lifting must be investigated and documented. Incorporation of investigation findings into work procedures must be accomplished to prevent future injuries.

OO. Motor Vehicles & Mechanized Equipment.

- 1. Only authorized employees will drive or operate a company-owned motor vehicle or mechanized equipment in the course and scope of their work. Employees assigned a vehicle to take home will follow the Company's Vehicle Safety & Operations manual published separately.
- 2. Motor vehicles and mechanized equipment include all self-propelled vehicles, and self-propelled, mechanized equipment used for earth moving and materials handling.
- 3. Vehicles shall be maintained in a safe working order. Drivers/operators will inspect the vehicle or motorized equipment each day before use. If there are any problems, immediately follow your company's procedure for taking defective vehicles and equipment out of service. Follow the Driver's Inspection Report as shown in the **Figure 15 – Driver's Inspection Report** (located at the end of this manual) when pre-checking the vehicle they will be driving for the day.
- 4. Drivers/operators will ensure the vehicle is of the correct size and designed for intended use.
- 5. Employees operating a company motor vehicle shall have in his/her possession at all times a valid State Motor Vehicle Operator's license.
- 6. Drivers shall not operate a motor vehicle while under the influence of alcohol, illegal drugs, prescription or over-the-counter medications that might impair their driving skills.
- 7. Drivers/operators will follow safe driver behaviors.

- a. Only hands-free cell phone use is allowed (if the State the vehicle is in allows it).
  - b. Non hands-free cell phone use is prohibited while driving.
  - c. Avoid manipulating radios or other equipment which may cause distraction.
  - d. Do not exceed posted speed limits.
  - e. Maintain a safe distance between other vehicles as speed, weather, and road conditions dictate.
8. Anyone operating or riding as a passenger in a motor vehicle or mechanized equipment equipped with seat belts will wear a seat belt. If the vehicle has faulty seat belts or any other deficiency do not use it, contact your supervisor immediately.
  9. No one is allowed to ride in the back of a pick-up truck or utility van.
  10. Authorized drivers will report any collision or traffic violation while driving on company duties to the appropriate personnel.
  11. Loads shall be secure and shall not exceed the manufacturer's specifications and legal limits for the vehicle.
  12. Never use a motor vehicle or earth-moving or compacting equipment if the rear view is obstructed, unless it has a reverse signal alarm or an observer outside the vehicle signals that it is safe to move.
  13. Lower, block or crib suspended heavy machinery, equipment and any of their parts so the load won't fall or shift when workers have to move under or between them.
  14. Set the vehicle or mechanized equipment parking brakes when parked on an incline or stopped for any period of time.
  15. Keep the windows and mirrors clean so that visibility will be as clear as possible.

**PP. Office Trailers.**

1. Good housekeeping is a must. Keep your work area clean and orderly. An open desk or cabinet drawer is a hazard which can cause yourself or others serious injury.
2. DO NOT keep defective chairs or other office furniture in use. Report them to your supervisor for removal, replacement, or repair.
3. Carry pencils, pens, scissors, etc. in such a way that sharp points cannot cause puncture wounds to yourself or others.
4. DO NOT overload electric cords or outlets.
5. A standard file cabinet can cause serious injury if it turns over as a result of one too many drawers left open at the same time. Place heavier material in the lower drawers, with lighter weight material in the upper drawers. Allow one drawer to be open at a time.
6. Never adjust or clean a piece of office equipment while it is in operation. Always unplug the equipment prior to attempting any adjustments or cleaning.
7. DO NOT attempt any electrical repairs on office equipment. Notify your supervisor of the problem and contact a qualified service person.
8. Do your reading at your desk - not while walking!
9. When using stairways, take your time and use the handrails.
10. DO NOT stand in front of closed doors which could be opened suddenly.
11. If you must reach high on shelves or do any climbing, use a ladder - not a chair, a cabinet, makeshift boxes, etc.
12. Smoking is prohibited in all office environments.
13. Employees should know locations of fire extinguishers for emergency use.
14. Keep all exit doors unlocked while the office trailer is occupied.

**QQ. Personal Protective Equipment.**

1. Personal protective equipment is designed to protect workers from workplace hazards in situations where engineering controls and other established methods are not feasible or effective.
2. Body Protection:
  - a. Wear clothing appropriate for the duties to be performed shall be worn by all workers. Shirtsleeves must be at least 4" in length. Loose clothing, dangling jewelry, or long hair that poses an entanglement hazard must be either removed or secured against entanglement.
  - b. Wear an approved coverall or apron when welding or flame torch cutting.

- c. Wear 4-8 calorie flame-resistant clothing when working around exposed energized electrical parts that are pushing 50 to 480 volts.
  - d. Before working where voltage exceeds 480 volts, check with your supervisor for additional training and the appropriate personal protective equipment.
3. Eye and Face Protection:
- a. Approved eye protection with side-shields shall be worn at all times in the work area. All eye protection must meet ANSI 287.1 specifications and be so marked.
  - b. Wear approved safety glasses or goggles at all times on the jobsite, unless you are in a trailer or protected office.
  - c. Wear a face shield and safety glasses to protect your face from flying particles, grinding sparks, chemical splashes and other potential hazards.
  - d. When hammer-drilling at shoulder level or above safety glasses and a face shield, or goggles alone, must be worn.
  - e. Wear an 8calorie arc flash face shield when working around exposed energized electrical parts that are pushing 50 to 480 volts.
  - f. When working where voltage exceeds 480 volts, check with your supervisor about any additional training or personal protective equipment you may need.
  - g. Wear an approved welding helmet when you are welding.
  - h. Always wear safety glasses under your face shield or welding helmet.
  - i. Make sure that you have the properly shaded lens or lenses when exposed to radiant energy (light), such as when welding, torch cutting, soldering or brazing.
4. Hand Protection:
- a. Wear the proper gloves when moving materials or working with sharp objects or material such as sheet metal.
  - b. Wear the proper type of impermeable gloves for work around chemicals and human body fluids.
  - c. Wear approved welding gloves whenever welding or flame torch cutting.
  - d. Wear Class 00 rubber insulated gloves when working around exposed energized electrical parts that are pushing 50 to 480 volts.
  - e. Before working where voltage exceeds 480 volts, check with your supervisor for additional training and the appropriate personal protective equipment.
  - f. During jobsites requiring a Mandatory Glove Policy the appropriate hand protection is required to be worn by all employees 100% of the time. Proper glove selection should be based on evaluation of the hazards associated with the task. Exceptions may be granted if wearing a glove creates a greater hazard (Le. around rotating equipment). If you feel that a glove would create a greater hazard, see your supervisor.
5. Head Protection:
- a. Hard hats meeting ANSI 289.1 specifications will be worn at all times in the work area unless other instructions are given by supervision (i.e. welders wearing welding hoods while laying on their back underneath pipe). The brim of cap style hard hats shall always face forward when possible unless it obstructs the wearer's view. **(NOTE: The manufacturer must allow the brim to be worn backwards before users are allowed to do so. All Fibre-Metal hard hats are certified to be worn with the brim facing backwards).**
  - b. Wear a Class E hard hat when working around exposed energized electrical parts that are pushing 50 to 480 volts. When working where the voltage exceeds 480 volts, check with your supervisor for additional training and the appropriate personal protective equipment.
6. Foot Protection:

- a. Only substantial, leather, heavy-soled work boots shall be worn by workers. DO NOT wear athletic style shoes unless instructed to do so by supervision. "Safety-toe" boots are recommended, but are not required. Special Purpose Footwear, such as PVC or neoprene boots, may be required to provide maximum protection whenever employees could be exposed to corrosives or irritant chemicals. Strong consideration shall be given to footwear that incorporates a steel shank. Employees performing tasks that potentially expose them to extreme foot injury hazards shall wear metal foot protectors (Le. operating a ground tamper or chipping concrete with a jackhammer).
  - b. Metatarsal protectors are available when workers are exposed to heavy materials falling on their feet.
7. Hearing Protection:
- a. Hearing protection shall be worn in "noise-risk" areas as needed and required. If noise exposures cannot be reduced below the allowable level of 85 dba (decibels) for an eight-hour period, employees must wear approved hearing protection.
  - b. Wear approved earplugs or earmuffs whenever you are exposed to loud noise. The noise level next to an operating air compressor or circular saw is too loud to safely endure over extended time without hearing protection. If you cannot hear someone speaking in a normal tone 3feet or less away from you, consider using hearing protection.
  - c. If you are unsure about the noise level in your work area, wear the approved hearing protection.
8. Respiratory Protection:
- a. Employees are not allowed to enter into any area requiring respiratory protection before proper planning, training, testing, and physical evaluations have been completed, and the work area declared safe for employee occupancy. Employees required to wear respirators will be medically cleared, fit tested and completely trained in the respiratory protection program. Unless you, as an employee, have completed these pre-use requirements, you are specifically prohibited from using a respirator and entering any space that would require such protection. Employees wearing respirators will comply with the Company's Respiratory Policy & Procedures published under separate cover.

- b. Ensure you have the proper respiratory protection training, medical clearance, and fit test before using any respirator.
- c. Request a copy of your company's respiratory protection program and follow it closely.
- d. Participate in the respirator selection process to ensure you are using the proper type and class of respirator.
- e. Only use respirators approved by the National Institute for Occupational Health and safety (NIOSH). Look for "NIOSH" on the respirator.
- f. Go through a formal respirator fit testing process to select a properly fitting respirator.
- g. Where applicable, conduct a negative and positive pressure check each time you put on a respirator, and before you enter the contaminated area. If either test fails, do not use the respirator. Report to your supervisor immediately for another formal fit test.

**RR. Pneumatic Tools.**

- 1. Pneumatic tools are tools powered by compressed air.
- 2. General:
  - a. Check the manufacturer's safe operating pressure for each tool or fitting before using it.
  - b. Never exceed the established safe operating pressure for the tool or fitting.
  - c. Properly secure the hose to the compressor before attaching the tool or fitting.
  - d. Properly secure tools to their hoses before using them.
  - e. Use safety clips or retainers on pneumatic impact tools to keep the attachments from being expelled.
  - f. Ensure that the system is equipped with a pressure reduction device at the source of supply or branch line when hoses exceed 1/2-inch in diameter.

**SS. Powder Actuated Tools.**

- 1. Powder actuated tools are tools actuated by explosive powder, which is detonated by a primer.
- 2. General:
  - a. Training is required before operating a powder actuated tool. Operators will carry their certification on them while operating a powder actuated tool.
  - b. Test the tool each day before using it. If any part of the tool is defective, immediately take it out of service.
  - c. Never load a powder actuated tool unless it will be used immediately after loading.
  - d. Never leave a loaded powder actuated tool unattended.
  - e. Always keep the point of operation pointed in a safe direction.
  - f. If a miss-fire occurs turn the strip around and try again. If it fails again place the strip in a container of water and let it set overnight to render the gun powder harmless.

**TT. Power Transmission and Distribution.**

- 1. Power transmission and distribution refers to power lines and other energized parts providing electrical service to buildings and facilities.
- 2. General:
  - a. Make sure that an inspection and/or tests have been completed to identify existing conditions before starting work, including, but not limited to:
    - (1) Energized lines and equipment
    - (2) Condition of poles
    - (3) Location of circuits and equipment, including power communications, cable television and fire alarm circuits
  - b. Treat all electrical equipment and lines as if they are energized until they are determined to be de-energized by tests or other appropriate methods. .
  - c. Determine the operating voltages of electrical equipment and lines before working near energized parts.
  - d. Carefully inspect rubber protective equipment each time before using it.
  - e. Make sure that protective equipment made from materials other than rubber provides equal or better protection.
- 3. Operating Equipment

- a. Check and carefully observe safe clearance distances before operating equipment around power lines.

UU. Pressure Testing. (See Leak Testing section).

VV. Process Safety Management.

1. Regulatory standards.

- a. 29 CFR 1926.64 - Process safety management of highly hazardous chemicals.
- b. 29 CFR 1910.119 - Process safety management of highly hazardous chemicals.

2. Purpose. The Process Safety Management (PSM) of Highly Hazardous Chemicals (HHCs) is intended to prevent or minimize the consequences of a catastrophic release of toxic, reactive, flammable or explosive HHCs from a process in various industries. A process is any activity or combination of activities including any use, storage, manufacturing, handling or the onsite movement of HHCs. A process includes any group of vessels which are interconnected and separate vessels which are located such that a HHC could be involved in a potential release.

3. Application. This section applies to the following:

- a. A process which involves a chemical at or above the specified threshold quantities listed in Appendix A to this section;
- b. A process which involves a Category 1 flammable gas (as defined in § 1910.1200(c)) or flammable liquid with a flashpoint below 100 °F (37.8 °C) on site in one location, in a quantity of 10,000 pounds (4535.9 kg) or more **except for**:
  - (1) Hydrocarbon fuels used solely for workplace consumption as a fuel (e.g., propane used for comfort heating, gasoline for vehicle refueling), if such fuels are not a part of a process containing another highly hazardous chemical covered by this standard;
  - (2) Flammable liquids stored in atmospheric tanks or transferred which are kept below their normal boiling point without benefit of chilling or refrigeration. Flammable liquids with a flashpoint below 100 °F (37.8 °C) stored in atmospheric tanks or transferred that are kept below their normal boiling point without benefit of chilling or refrigeration.

4. Employee participation.

- a. Each Arden employee must follow the safety rules of the facility including the safe work practices required.
- b. The contract employer shall advise Arden of any unique hazards presented by Arden's work, or of any hazards found by Arden's work.
- c. Communication must be made between Arden's work crew and customer representative before and after work is completed. Any additional information, such as identified parts or materials that need to be repaired must be conveyed.
- d. Arden employees are responsible for reporting hazardous conditions and dangers to their supervisor. Employees have the right to refuse unsafe work conditions.

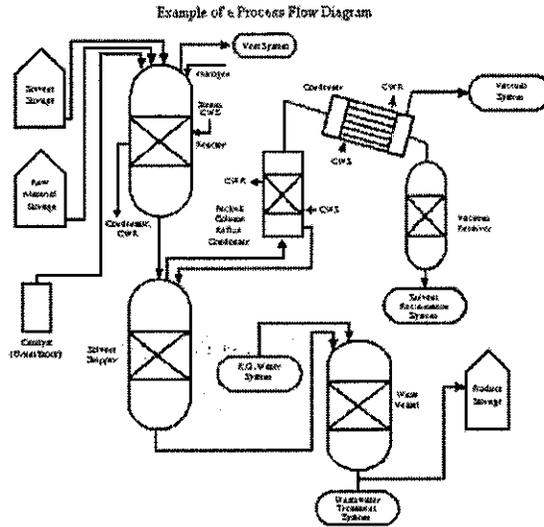
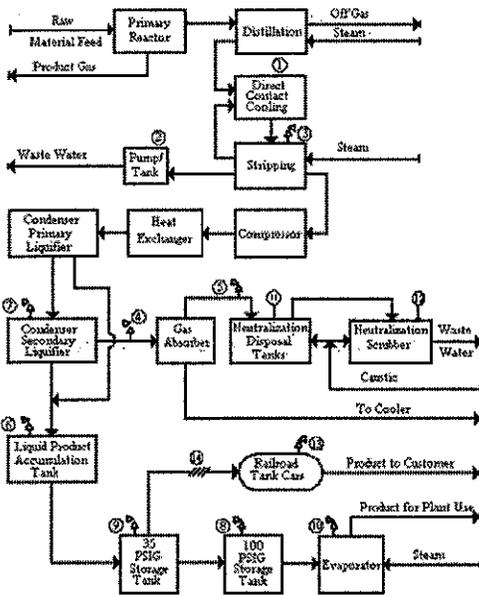
5. Process Safety Information & Hazard Analysis.

- a. Arden customers shall complete a compilation of written process safety information and conduct process hazard identification before commencing work. This information is to help employees and contractors involved to identify and understand the hazards posed by those processes involving highly hazardous chemicals.
- b. Information pertaining to the hazards of the highly hazardous chemicals in the process and shall include the following.
  - (1) Toxicity information
  - (2) Permissible exposure limits
  - (3) Physical data
  - (4) Reactivity data

- (5) Corrosivity data
- (6) Thermal and chemical stability data and
- (7) Hazardous effects of inadvertent mixing of different materials that could foreseeably occur.

c. Information pertaining to the technology of the process shall include at least the following:

- (1) A block flow diagram or simplified process flow diagram
- (2) Process chemistry
- (3) Maximum intended inventory
- (4) Safe upper and lower limits for such items as temperatures, pressures, flows or compositions and
- (5) An evaluation of the consequences of deviations, including those affecting the safety and health of employees.



d. Information pertaining to the equipment in the process shall include:

- (1) Materials of construction;
- (2) Piping and instrument diagrams (PI&D's);
- (3) Electrical classification;
- (4) Relief system design and design basis;
- (5) Ventilation system design;
- (6) Design codes and standards employed material and energy balances for processes built after May 26, 1992, and ;
- (7) Safety systems (e.g. interlocks, detection or suppression systems).

e. A Process Hazard Analysis shall utilize one or more of the following:

- (1) What-IF;
- (2) Checklist;
- (3) What-IF/Checklist;
- (4) Hazard and Operability Study (HAZOP);
- (5) Failure Mode and Effects Analysis (FMEA);
- (6) Fault Tree Analysis, or;
- (7) An appropriate equivalent methodology.

f. The process hazard analysis shall address:

- (1) The hazards of the process;
- (2) The identification of any previous incidents which had a likely potential for catastrophic consequences in the work place;

- (3) Engineering and administrative controls;
  - (4) Consequences of failure;
  - (5) Facility siting;
  - (6) Human factors, and;
  - (7) A qualitative evaluation of a range of the possible safety and health effects of failure of controls on employees in the workplace.
6. Operating procedures.
- a. Operating procedures must provide clear instructions for safely conducting activities involved in each process and shall include the steps for each operating phase. Operating procedures shall be readily accessible to employees who work in or maintain a process.
7. Contractors. Contractors that perform maintenance or repair, turnaround, major renovation, or specialty work on or adjacent to a covered process must follow these procedures:
- a. Employer responsibilities:
    - (1) Obtain and evaluate information regarding contractor's safety performance and programs.
    - (2) Inform contractor of the known potential fire, explosion, or toxic release hazards related to the contractor's work and the process.
    - (3) Explain the emergency action plan.
    - (4) Control the entrance, presence and exit of contractors in covered process areas.
    - (5) Periodically evaluate the performance of contractors.
    - (6) Maintain a contract employee injury and illness log in their process areas.
  - b. Contract employer responsibilities:
    - (1) Assure that each contract employee is trained in the work practices necessary to safely perform his/her job.
    - (2) Assure that each contract employee is instructed in the known potential fire, explosion, or toxic release hazards related to his/her job and the process, and the applicable provisions of the emergency action plan.
    - (3) Document that each contract employee has received and understood the training required by this paragraph. The contract employer shall prepare a record which contains the identity of the contract employee, the date of training, and the means used to verify that the employee understood the training.
    - (4) Advise the employer of any unique hazards presented by the contract employer's work, or of any hazards found by the contract employer's work.
8. Mechanical integrity.
- a. Process Safety Management applies to the following process equipment:
    - (1) Pressure vessels and storage tanks;
    - (2) Piping systems and components such as valves;
    - (3) Relief and vent systems and devices;
    - (4) Emergency shutdown systems;
    - (5) Controls including monitoring devices and sensors, alarms, and interlocks, and;
    - (6) Pumps.
  - b. Written procedures shall be established and implemented by the customer. Training shall be conducted for each employee involved in maintain the on-going integrity of process equipment and its hazards and in the procedures applicable to the employee's job tasks to assure that the employee can perform the job tasks in a safe manner.
  - c. Training for process maintenance activities. The employer shall train each employee involved in maintaining the on-going integrity of process equipment in an overview of that process and its hazards and in the procedures applicable to the employee's job tasks to assure that the employee can perform the job tasks in a safe manner.

- d. Inspection tests shall be performed on process equipment. Each inspection and test shall follow recognized good engineering practices. The frequency shall follow the manufacturer's recommendations. These inspection tests shall be documented.
  - e. Quality assurance for plants and equipment shall be performed during the construction of new plants and equipment. The customer is responsible that the equipment is fabricated and is suitable for the process application for which they will be used. Checks and inspections shall be performed to assure that equipment is installed properly and consistent with design specifications and the manufacturer's instructions.
9. Hot work permits.
- a. The customer shall issue a hot work permit for hot work operations conducted on or near a covered process.
  - b. The permit shall document that fire prevention and protection requirements have been implemented prior to beginning the hot work operations. Arden employees shall not perform hot work until a hot work permit is obtained from customer. The Hot Work Permit shall:
    - (1) Indicate the date(s) authorized for hot work;
    - (2) Identify the object on which hot work is to be performed, and;
    - (3) Kept on file until completion of hot work operations (typically one year).
10. Pre-startup and safe work practices.
- a. Arden strives to ensure their employees are following safe work practices. Arden employees shall abide by employers safe work practices during operations such as pre-startup, commissioning, lockout/tagout, confined space entry, opening process equipment or piping and controls over entrance to facility. Communication shall be made by the supervisor or foreman with the customer and obtain a Safe Work Permit before commencing any work. No work shall commence until the appropriate permit is received by the working crew. All Arden hot work, lockout/tagout and confined space procedures shall be followed.
11. Management of change (MOC).
- a. Management of change procedures (except for "replacements in kind") shall be used to manage changes to process chemicals, technology, equipment, and procedures and changes to facilities that affect a covered process. This usually involves several signatures along the chain of command all the way to the corporate office on the customer side of things.
  - b. Communication shall be made when repairing or maintenance of PSM systems. Arden employees shall work together with the customer to make sure these changes are managed correctly. It is very important that parts are not replaced with anything that does not meet original specifications without the MOC process.
12. Incident investigations.
- a. Each incident which results in or could reasonably have resulted in a catastrophic release of highly hazardous chemicals in the workplace must be investigated. These investigations need to be completed as promptly as possible, but not later than 48 hours following the incident. If Arden employees are involved in such an incident, they must be reported immediately and copies of the Arden Incident Review Form shall be completed and submitted to the customer and Arden's Safety Director.
13. Emergency action plan.
- a. Follow the emergency action plan developed for each customer location. Typically the following takes place:
    - (1) Alarm is sounded alerting Arden employees of emergency.
    - (2) Work must be stopped immediately, ignition sources will be disengaged, tools and personal belongings left behind.

- (3) Employees shall evacuate to the nearest evacuation as directed. If there is no audible paging system, employees shall pay attention to the plant wind sock direction and proceed upwind.
- (4) Know the location of safety showers and eye wash stations in case of contamination.
- (5) Head count will be performed by Arden foreman or authorized personnel.
- (6) First aid or emergency services will be provided as necessary.

14. Compliance audits.

- a. Compliance audits must be completed at least every 3 years to verify that the procedures and practices developed under the standard are adequate and are being followed.
- b. The compliance audit shall be conducted by at least one person knowledgeable in the process.
- c. A report of the findings of the audit shall be developed.
- d. The employer shall promptly determine and document an appropriate response to each of the findings of the compliance audit, and document that deficiencies have been corrected.
- e. Employers shall retain the two (2) most recent compliance audit reports.

15. Trade secrets.

- a. Arden employers must respect the confidentiality of trade secret information when the process safety information is released to them.

16. Training.

- a. Initial training.
  - (1) Each employee shall be trained in the work practices necessary to safely perform his/her job.
  - (2) The contract employer shall assure that each contact employee is instructed in the known potential fire, explosion, or toxic release hazards related to his/her job and the process, and the applicable provisions of the emergency action plan.
  - (3) Training will be documented and kept in the Arden employee safety training file. Documentation will include a sign-in sheet with the identity of the employee, trainer's name and the means used to verify that the employee understood the training such as a safety quiz.
  - (4) All affected employees working in PSM areas (designated Restricted Areas) must be trained in:
    - (a) an overview of the process;
    - (b) hazards of the process;
    - (c) procedures applicable to the employee's job, and;
    - (d) Emergency Action Plan (EAP).
- b. Refresher training.
  - (1) Refresher training shall be conducted and documented for all employees involved in the operating of a process at least every 3 years, or more often as necessary. An evaluation of the previous 3 years with employee input will be used to determine the content of the refresher training.

17. Appendix A - List of highly hazardous chemicals, toxics and reactives.

This Appendix contains a listing of toxic and reactive highly hazardous chemicals which present a potential for a catastrophic event at or above the threshold quantity.

Chemical Name	CAS**	TQ**
Acetaldehyde.....	75-07-0	2500
Acrolein (2-Propenal).....	107-02-8	150
Acrylyl Chloride.....	814-68-6	250
Allyl Chloride.....	107-05-1	1000
Allylamine.....	107-11-9	1000
Alkylaluminums.....	Varies	5000
Ammonia, Anhydrous.....	7664-41-7	10000
Ammonia solutions (greater than 44 percent ammonia by weight).....	7664-41-7	15000
Ammonium Perchlorate.....	7790-98-9	500
Ammonium Permanganate.....	7787-36-2	7500
Arsine (also called Arsenic Hydride)....	7784-42-1	100
Bis(Chloromethyl) Ether.....	542-88-1	100
Boron Trichloride.....	10294-34-5	2500
Boron Trifluoride.....	7637-07-2	250
Bromine.....	7726-95-6	1500
Bromine Chloride.....	13863-41-7	1500
Bromine Pentafluoride.....	7789-30-2	2500
Bromine Trifluoride.....	7787-71-5	15000
3-Bromopropyne (also called Propargyl Bromide).....	106-96-7	100
Butyl Hydroperoxide (Tertiary).....	75-91-2	5000
Butyl Perbenzoate (Tertiary).....	614-45-9	7500
Carbonyl Chloride (see Phosgene).....	75-44-5	100
Carbonyl Fluoride*.....	353-50-4	2500
Cellulose Nitrate (concentration greater than 12.6 percent nitrogen)....	9004-70-0	2500
Chlorine.....	7782-50-5	1500
Chlorine Dioxide.....	10049-04-4	1000
Chlorine Pentafluoride.....	13637-63-3	1000
Chlorine Trifluoride.....	7790-91-2	1000
Chlorodiethylaluminum (also called Diethylaluminum Chloride).....	96-10-6	5000
1-Chloro-2,4-Dinitrobenzene.....	97-00-7	5000
Chloromethyl Methyl Ether.....	107-30-2	500
Chloropicrin.....	76-06-2	500
Chloropicrin and Methyl Bromide mixture.	None	1500
Chloropicrin and Methyl Chloride mixture.....	None	1500
Commune Hydroperoxide.....	80-15-9	5000
Cyanogen.....	460-19-5	2500
Cyanogen Chloride.....	506-77-4	500
Cyanuric Fluoride.....	675-14-9	100
Diastole Peroxide (concentration greater than 70 percent).....	110-22-5	5000
Diazomethane.....	334-88-3	500

Dibenzoyl Peroxide.....	94-36-0	7500
Diborane.....	19287-45-7	100
Dibutyl Peroxide (Tertiary).....	110-05-4	5000
Dichloro Acetylene.....	7572-29-4	250
Dichlorosilane.....	4109-96-0	2500
Diethylzinc.....	557-20-0	10000
Diisopropyl Peroxydicarbonate.....	105-64-6	7500
Dilauroyl Peroxide.....	105-74-8	7500
Dimethyldichlorosilane.....	75-78-5	1000
Dimethylhydrazine, 1,1-.....	57-14-7	1000
Dimethylamine, Anhydrous.....	124-40-3	2500
2,4-Dinitroaniline.....	97-02-9	5000
Ethyl Methyl Ketone Peroxide (also Methyl Ethyl Ketone Peroxide; concentration greater than 60 percent)	1338-23-4	5000
Ethyl Nitrite.....	109-95-5	5000
Ethylamine.....	75-04-7	7500
Ethylene Fluorohydrin.....	371-62-0	100
Ethylene Oxide.....	75-21-8	5000
Ethyleneimine.....	151-56-4	1000
Fluorine.....	7782-41-4	1000
Formaldehyde (Formalin).....	50-00-0	1000
Furan.....	110-00-9	500
Hexafluoroacetone.....	684-16-2	5000
Hydrochloric Acid, Anhydrous.....	7647-01-0	5000
Hydrofluoric Acid, Anhydrous.....	7664-39-3	1000
Hydrogen Bromide.....	10035-10-6	5000
Hydrogen Chloride.....	7647-01-0	5000
Hydrogen Cyanide, Anhydrous.....	74-90-8	1000
Hydrogen Fluoride.....	7664-39-3	1000
Hydrogen Peroxide (52 percent by weight or greater).....	7722-84-1	7500
Hydrogen Selenide.....	7783-07-5	150
Hydrogen Sulfide.....	7783-06-4	1500
Hydroxylamine.....	7803-49-8	2500
Iron, Pentacarbonyl.....	13463-40-6	250
Isopropylamine.....	75-31-0	5000
Ketene.....	463-51-4	100
Methacrylaldehyde.....	78-85-3	1000
Methacryloyl Chloride.....	920-46-7	150
Methacryloyloxyethyl Isocyanate.....	30674-80-7	100
Methyl Acrylonitrile.....	126-98-7	250
Methylamine, Anhydrous.....	74-89-5	1000
Methyl Bromide.....	74-83-9	2500
Methyl Chloride.....	74-87-3	15000
Methyl Chloroformate.....	79-22-1	500
Methyl Ethyl Ketone Peroxide (concentration greater than 60 percent).....	1338-23-4	5000
Methyl Fluoroacetate.....	453-18-9	100
Methyl Fluorosulfate.....	421-20-5	100
Methyl Hydrazine.....	60-34-4	100
Methyl Iodide.....	74-88-4	7500
Methyl Isocyanate.....	624-83-9	250
Methyl Mercaptan.....	74-93-1	5000

Methyl Vinyl Ketone.....	79-84-4	100
Methyltrichlorosilane.....	75-79-6	500
Nickel Carbonyl (Nickel Tetracarbonyl)...	13463-39-3	150
Nitric Acid (94.5 percent by weight or greater).....	7697-37-2	500
Nitric Oxide.....	10102-43-9	250
Nitroaniline (para Nitroaniline).....	100-01-6	5000
Nitromethane.....	75-52-5	2500
Nitrogen Dioxide.....	10102-44-0	250
Nitrogen Oxides (NO; NO(2); N2O4; N2O3)...	10102-44-0	250
Nitrogen Tetroxide (also called Nitrogen Peroxide).....	10544-72-6	250
Nitrogen Trifluoride.....	7783-54-2	5000
Nitrogen Trioxide.....	10544-73-7	250
Oleum (65 percent to 80 percent by weight; also called Fuming Sulfuric Acid).....	8014-94-7	1000
Osmium Tetroxide.....	20816-12-0	100
Oxygen Difluoride (Fluorine Monoxide)...	7783-41-7	100
Ozone.....	10028-15-6	100
Pentaborane.....	19624-22-7	100
Peracetic Acid (concentration greater than 60 percent Acetic Acid; also called Peroxyacetic Acid).....	79-21-0	1000
Perchloric Acid (concentration greater than 60 percent by weight).....	7601-90-3	5000
Perchloromethyl Mercaptan.....	594-42-3	150
Perchloryl Fluoride.....	7616-94-6	5000
Peroxyacetic Acid (concentration greater than 60 percent Acetic Acid; also called Peracetic Acid).....	79-21-0	1000
Phosgene (also called Carbonyl Chloride)...	75-44-5	100
Phosphine (Hydrogen Phosphide).....	7803-51-2	100
Phosphorus Oxychloride (also called Phosphoryl Chloride).....	10025-87-3	1000
Phosphorus Trichloride.....	7719-12-2	1000
Phosphoryl Chloride (also called Phosphorus Oxychloride).....	10025-87-3	1000
Propargyl Bromide.....	106-96-7	100
Propyl Nitrate.....	627-3-4	2500
Sarin.....	107-44-8	100
Selenium Hexafluoride.....	7783-79-1	1000
Stibine (Antimony Hydride).....	7803-52-3	500
Sulfur Dioxide (liquid).....	7446-09-5	1000
Sulfur Pentafluoride.....	5714-22-7	250
Sulfur Tetrafluoride.....	7783-60-0	250
Sulfur Trioxide (also called Sulfuric Anhydride).....	7446-11-9	1000
Sulfuric Anhydride (also called Sulfur Trioxide).....	7446-11-9	1000
Tellurium Hexafluoride.....	7783-80-4	250
Tetrafluoroethylene.....	116-14-3	5000
Tetrafluorohydrazine.....	10036-47-2	5000
Tetramethyl Lead.....	75-74-1	1000
Thionyl Chloride.....	7719-09-7	250

Trichloro (Chloromethyl) Silane.....	1558-25-4	100
Trichloro (dichlorophenyl) Silane.....	27137-85-5	2500
Trichlorosilane.....	10025-78-2	5000
Trifluorochloroethylene.....	79-38-9	10000
Trimethoxysilane.....	2487-90-3	1500

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Footnote(\*) Chemical Abstract Service Number

Footnote(\*\*) Threshold Quantity in Pounds (Amount necessary to be covered by this standard.)

## WW. Rigging.

1. Regulatory standards.
  - a. 29 CFR 1926.251 – Rigging equipment for material handling.
  - b. ANSI/ASSE A10.42-2000 – Safety Requirements for Rigging Qualifications and Responsibilities.
2. General.
  - a. Rigging equipment for material handling shall be inspected prior to use on each shift and as necessary during its use to ensure that it is safe. Damaged or defective slings shall be immediately removed from service and destroyed or marked as “**Defective – Do not use!**” if destruction cannot be immediately accomplished.
  - b. Rigging equipment shall not be loaded in excess of its recommended safe working load.
  - c. Rigging equipment, when not in use, shall be removed from the immediate work area so as not to present a hazard to employees.
  - d. Special custom design grabs, hooks, clamps, or other lifting accessories, for such units as modular panels, prefabricated structures and similar materials, shall be marked to indicate the safe working loads and shall be proof-tested prior to use to 125 percent of their rated load.
  - e. Tag lines shall be used unless their use creates an unsafe condition.
  - f. All employees shall be kept clear of loads about to be lifted and of suspended loads.
3. Performance Requirements.
  - a. Qualified riggers shall be trained and will only perform rigging activities for which their experience and training applies.
  - b. Qualified riggers shall not use substandard or unsafe equipment or methods. Upon request of a qualified rigger, the competent person shall ensure that the qualified rigger is provided information, procedures, and equipment necessary to move the loads without damage or injury to the site, equipment, or personnel.
  - c. Qualified riggers shall report deficiencies in methods, equipment, information, and training to a competent person.
  - d. Rigging in critical operations, as defined in this standard, shall be performed under the direction of a qualified rigger.
4. Known Critical Operations.
  - a. A qualified rigger, supervisor or a competent person must develop a Critical Lift Plan for the following:
    - (1) **Hoisting, Lifting, and Winching Capacity.** When any power or manual mechanical device used for hoisting, lifting or winching is used within 15 percent of its rated capacity (85 percent of its maximum rated load/capacity).
    - (2) **Multiple Loads.** When more than one independent load is hoisted at once on one primary hoist line, the operation should be deemed a critical operation. The practice commonly called "Christmas tree-ing" is included.
    - (3) **Lifting of Personnel.** Whenever personnel are lifted, the operation shall be deemed critical.
    - (4) **Helicopter Lifts.** When a helicopter is involved in a lift, the operation shall be deemed critical.
    - (5) **Multiple Crane Lifts.** Any single lift involving two or more cranes, regardless of any cranes' capacity, shall be deemed a critical operation.
5. Possible Critical Operations.
  - a. A qualified rigger, supervisor or a competent person may determine that an operation is critical, which may require job-specific procedures. When determining what constitutes a critical operation, items for consideration might include the following:
    - (1) **Mechanical and Electrical Hazards.** When rigging operations take place in close proximity to electrical or mechanical energy sources that are not locked out and de-energized, and where danger to the riggers or other personnel involved in the rigging activity exists.

- (2) **Hazards of Moving Equipment.** When rigging operations take place in close proximity to moving machinery, vehicles, or equipment, if danger to the riggers or other personnel involved in the rigging activity exists.
  - (3) **Hazardous Materials.** When rigging activities occur in environments where the presence or possible release of hazardous materials endanger the riggers or other personnel.
  - (4) **Confined Spaces.** When rigging operations take place in a confined space. For purposes of this standard, "confined or enclosed space" means any space having a limited means of egress, is subject to the accumulation of toxic or flammable contaminants, or has an oxygen-deficient atmosphere. Confined or enclosed spaces may include, but are not limited to, storage tanks, process vessels, bins, boilers, ventilation or exhaust ducts, sewers, underground utility vaults, four feet in depth such as pits, tubs, vaults, vessels, and cofferdams.
  - (5) **Lifting Over Personnel.** When loads must be moved over personnel.
  - (6) **Public Protection.** When rigging operations take place in close proximity to the public, where danger to the riggers or other personnel involved in the rigging activity exists from foreseeable activity of the public, or where a danger to the public exists from foreseeable consequences of the rigging operation.
  - (7) **Multiple Hoists (Other Than Cranes).** Movement involving multiple hoists.
  - (8) **Ground and Support Considerations.** When cranes, hoists, or loads are set on or moved over ground that is not compacted or where underground structures, vaults, trenches, pipelines, pits, or other structures or voids exist or may exist.
  - (9) **Temporary Supports.** When loads are set on or moved across temporary structures or supports, or when cranes or hoists are set up on or are supported by temporary structures or supports during the rigging process.
  - (10) **Floor/Structure Loading.** When loads are moved across floors, roofs, decks, or other portions of a permanent structure, riggers should give consideration to design loading capacity. If necessary, this shall be determined by a qualified person.
  - (11) **Weather Conditions.** When weather conditions such as, but not limited to, high winds, storms, lightning, fog, ice or snow may affect the operation and endanger the riggers or other persons.
6. **Operational Requirements.**
- a. **General Requirements.** When an operation is determined to be critical, a competent person shall be appointed who has overall responsibility for the critical rigging operation.
  - b. **Signaling.** Only designated signalers shall give signals to an operator. However, the operator shall obey an emergency STOP signal at all times, no matter who gives the signal.
  - c. **Suspended Loads.** Routes for suspended loads shall be pre-planned to ensure that exposure to other persons is minimized and that no employee is required to work directly below a suspended load, except for employees engaged in the initial connection of steel or employees necessary for the hooking or unhooking of the load. When working under suspended loads, the following criteria shall be met:
    - (1) Materials being hoisted shall be rigged to prevent unintentional displacement;
    - (2) Hooks with self-closing safety latches or their equivalent shall be used to prevent components from slipping out of the hook.
    - (3) Paragraph (2) above does not apply when hook latches are purposely held open as allowed in limited steel erection operations.
7. **Rigger qualification.**
- a. **General.** Employees who are designated to operate rigging tools and equipment or perform work covered by this standard shall be qualified and trained to the level of proficiency consistent with their assigned tasks. The employer or other entity responsible for supervising the lifting, hoisting, or movement of a load shall assess the knowledge, skills, and abilities of individuals designated as qualified riggers.
  - b. **Qualifications.** Employees designated as Competent Riggers shall meet the following qualifications:

- (1) **Communication.** Riggers shall be capable of understanding spoken and written English and should understand the language in use at the location.
  - (2) **Calculation Skills.** Have sufficient skills to calculate loads, load weights, safe capacities, and apply other safe rigging principles and procedures.
  - (3) **Skills.** Demonstrate the ability to utilize rigging materials and principles.
  - (4) **General Requirements.** A qualified rigger shall be capable of safely performing rigging operations.
  - (5) **Limited training or untrained.** If previous training is limited or didn't prepare a rigger for a task, the rigger shall not accept the task and management (the Person In Charge or Competent Person) shall not assign the task until the rigger is suitably trained.
8. **Rigger training.**
- a. Riggers shall be trained on the materials, methods, equipment, techniques, communication, and other items as is necessary for safe performance of their specific tasks.
  - b. Tasks for which qualified riggers may be trained on include (but are not limited to): preparing a load for safe movement; assisting in movement or directing the movement of the load; safe utilization of various hoisting and load movement equipment; or selecting components used to assist cranes, hoists, or other equipment to achieve mechanical advantage for the purpose of moving loads. A rigger may also assist in the setup, erection, movement, placement, and dismantling of cranes and other equipment.
  - c. Additional information from manufacturers of the rigging and hoisting equipment that is used in rigging procedures should be used for training as well, as available and as applicable to the specific rigging situations.
  - d. New or different equipment, methods, situations, techniques, procedures, standards, materials, and unique loads may require special or updated training during planning stages prior to rigging or moving the load(s).
  - e. Qualified Riggers shall have completed training in the safe application, use, and limitations of the rigging equipment they will use. The following list is not all inclusive:
    - (1) Anchor Points and deadmen
    - (2) Synthetic and ropes for rigging
    - (3) Chains
    - (4) Reeving
    - (5) Synthetic & wire rope slings
    - (6) Lifting points
    - (7) Come-alongs
    - (8) Rigging hitches/knots
    - (9) Hooks, shackles, eye bolts and similar attachment devices
    - (10) Chain hoists
    - (11) Inspections/testing requirements
    - (12) Tagging and removal from service
    - (13) Identification of repair and modifications
    - (14) Maintenance requirements
    - (15) Equipment capacity computations
    - (16) Effects of angles or indirect pulling
    - (17) **Load Preparation.** Qualified riggers shall have completed training on the following, if applicable to the person's specific tasks:
      - (a) The importance of and/or use of capacity charts
      - (b) Mechanical advantages
      - (c) Center of gravity
      - (d) D/d ratios
      - (e) Vectors and angles
      - (f) Boom angles and load radius
  - f. **Planning Activities Prior To and During Load Movement.** Qualified riggers shall have completed training on the following, if applicable to the person's specific tasks:

- (1) Blind hoists
  - (2) Fall protection
  - (3) Positioning the load
  - (4) Traveling with the load
  - (5) Work in close quarters
  - (6) Hand signals
  - (7) Communications (voice, radio, etc.)
  - (8) Procedures for emergencies or unexpected changes
  - (9) Procedures for lifting personnel
  - (10) Load dynamics
  - (11) Load weight estimation/determination
  - (12) Boom angle and load radius
- g. Training on This Standard. Qualified riggers shall be trained to understand the contents of this standard. (Note. Illumination, Fire Protection, Personal Protective Equipment (head, ears, hands, feet, lungs, eyes, body) are considerations for a riggers safety and the safety of the load and the site. See other ANSI or OSHA standards as applicable.)
- h. Training Experience. Training required shall be considered satisfied by employees who have completed a U.S. Department of Labor approved rigging course or equivalent that includes the training requirements in this standard (see Section 5.3). (Note. D.O.L. approved training is not mandatory. Any qualified and/or competent trainer can be used to impart the information required by this standard to an employee. Methods of training are not restricted, either.)
- i. Retraining. When the employer or enforcing authority has reason to believe that any affected employee who has already been trained does not have the understanding and skill required by this standard, the employer shall retrain each such employee. Circumstances where retraining is required include, but are not limited to:
- (1) Changes in the workplace or tasks render previous training obsolete; or
  - (2) Changes in the types of rigging systems or equipment to be used render previous training obsolete; or
  - (3) Inadequacies in an affected employee's knowledge, performance, use of rigging systems or equipment indicate that the employee has not retained the requisite understanding or skill.
- j. Recordkeeping. Records of training shall be kept by the employer. Only the most current applicable training records are necessary.
9. Rigging inspections.
- a. 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 Company. Additional inspections shall be performed during sling use, where service conditions warrant. Damaged or defective slings shall be immediately removed from service and destroyed or marked as **"Defective – Do not use!"** if destruction cannot be immediately accomplished.
10. Alloy steel chains.
- a. Welded alloy steel chain slings shall have permanently affixed durable identification stating size, grade, rated capacity, and sling manufacturer.
  - b. Whenever wear at any point of any chain link exceeds that shown in **Table 2 – Allowable Wear**, the assembly shall be removed from service.

Table 2 Allowable Wear

Chain size in inches	Maximum allowable wear in inches
1/4	3/64
3/8	5/64
1/2	7/64
5/8	9/64
3/4	5/32

7/8	11/64
1	3/16
1 1/8	7/32
1 1/4	1/4
1 3/8	9/32
1 1/2	5/16
1 3/4	11/32

- c. Hooks, rings, oblong links, pear-shaped links, welded or mechanical coupling links, or other attachments, when used with alloy steel chains, shall have a rated capacity at least equal to that of the chain.
- d. Job or shop hooks and links, or makeshift fasteners, formed from bolts, rods, etc., or other such attachments, shall not be used.
- e. Inspections. In addition to the inspection required by other paragraphs of this section, a thorough periodic inspection of alloy steel chain slings in use shall be made on a regular basis, to be determined on the basis of (A) frequency of sling use; (B) severity of service conditions; (C) nature of lifts being made; and (D) experience gained on the service life of slings used in similar circumstances. Such inspections shall in no event be at intervals greater than once every 12 months
- f. The Company shall make and maintain a record of the most recent month in which each alloy steel chain sling was thoroughly inspected, and shall make such record available for examination.

11. Wire rope.

- a. Protruding ends of strands in splices on slings and bridles shall be covered or blunted.
- b. Wire rope shall not be secured by knots, except on haul back lines on scrapers.
- c. The following limitations shall apply to the use of wire rope:
- d. An eye splice made in any wire rope shall have not less than three full tucks. However, this requirement shall not operate to preclude the use of another form of splice or connection which can be shown to be as efficient and which is not otherwise prohibited.
- e. Except for eye splices in the ends of wires and for endless rope slings, each wire rope used in hoisting or lowering, or in pulling loads, shall consist of one continuous piece without knot or splice.
- f. Eyes in wire rope bridles, slings, or bull wires shall not be formed by wire rope clips or knots.
- g. Wire rope shall not be used if, in any length of eight diameters, the total number of visible broken wires exceeds 10 percent of the total number of wires, or if the rope shows other signs of excessive wear, corrosion, or defect.
- h. When U-bolt wire rope clips are used to form eyes, **Table 3 – Number of Clips** shall be used to determine the number and spacing of clips. When used for eye splices, the U-bolt shall be applied so that the "U" section is in contact with the dead end of the rope.

Table 10 Number of Clips

Diameter in inches	Number of clips		Minimum spacing in inches
	Drop forged	Other material	
1/2	3	4	3
5/8	3	4	3 3/4
3/4	4	5	4 1/2

Diameter in inches	Number of clips		Minimum spacing in inches
7/8	4	5	5 1/4
1	5	6	6
1 1/8	6	6	6 3/4
1 1/4	6	7	7 1/2
1 3/8	7	7	8 1/4
1 1/2	7	8	9

- i. Slings shall not be shortened with knots or bolts or other makeshift devices.
  - j. Sling legs shall not be kinked.
  - k. Slings used in a basket hitch shall have the loads balanced to prevent slippage.
  - l. Slings shall be padded or protected from the sharp edges of their loads.
  - m. Hands or fingers shall not be placed between the sling and its load while the sling is being tightened around the load.
  - n. Shock loading is prohibited.
  - o. A sling shall not be pulled from under a load when the load is resting on the sling.
  - p. Minimum sling lengths.
    - (1) Cable laid and 6 X 19 and 6 X 37 slings shall have minimum clear length of wire rope 10 times the component rope diameter between splices, sleeves or end fittings.
    - (2) Braided slings shall have a minimum clear length of wire rope 40 times the component rope diameter between the loops or end fittings.
    - (3) Cable laid grommets, strand laid grommets and endless slings shall have a minimum circumferential length of 96 times their body diameter.
  - q. 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 deg. F. When non-fiber core wire rope slings of any grade are used at temperatures above 400 deg. F or below minus 60 deg. F, recommendations of the sling manufacturer regarding use at that temperature shall be followed.
  - r. End attachments.
  - s. Welding of end attachments, except covers to thimbles, shall be performed prior to the assembly of the sling.
  - t. All 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 proof test, and make it available for examination.
12. Synthetic webbing (nylon, polyester, and polypropylene).
- a. The Company shall have each synthetic web sling marked or coded to show:
    - (1) Name or trademark of manufacturer.
    - (2) Rated capacities for the type of hitch.
    - (3) Type of material.
  - b. Rated capacity shall not be exceeded.
  - c. Webbing. Synthetic webbing shall be of uniform thickness and width and selvage edges shall not be split from the webbing's width.
  - d. Fittings. Fittings shall be:
    - (1) Of a minimum breaking strength equal to that of the sling; and
    - (2) Free of all sharp edges that could in any way damage the webbing.
  - e. Attachment of end fittings to webbing and formation of eyes. Stitching shall be the only method used to attach end fittings to webbing and to form eyes. The thread shall be in an even pattern and contain a sufficient number of stitches to develop the full breaking strength of the sling.
  - f. Environmental conditions. When synthetic web slings are used, the following precautions shall be taken:
    - (1) Nylon web slings shall not be used where fumes, vapors, sprays, mists or liquids of acids or phenolics are present.
    - (2) Polyester and polypropylene web slings shall not be used where fumes, vapors, sprays, mists or liquids of caustics are present.

- (3) Web slings with aluminum fittings shall not be used where fumes, vapors, sprays, mists or liquids of caustics are present.
  - (4) Safe operating temperatures. Synthetic web slings of polyester and nylon shall not be used at temperatures in excess of 180 deg. F. Polypropylene web slings shall not be used at temperatures in excess of 200 deg. F.
  - g. Removal from service. Synthetic web slings shall be immediately removed from service if any of the following conditions are present:
    - (1) Acid or caustic burns;
    - (2) Melting or charring of any part of the sling surface;
    - (3) Snags, punctures, tears or cuts;
    - (4) Broken or worn stitches; or
    - (5) Distortion of fittings.
13. Shackles and hooks.
- a. The manufacturer's recommendations shall be followed in determining the safe working loads of the various sizes and types of specific and identifiable hooks. All hooks for which no applicable manufacturer's recommendations are available shall be tested to twice the intended safe working load before they are initially put into use. The employer shall maintain a record of the dates and results of such tests.
  - b. Hooks on overhaul ball assemblies, lower load blocks, or other attachment assemblies shall be of a type that can be closed and locked, eliminating the hook throat opening. Alternatively, an alloy anchor type shackle with a bolt, nut and retaining pin may be used.

14. Rigging safety guide.

**Rule # 1 – Determine the weight of the load.** The weight of a load must be established and compared to the capacities of the lifting equipment, slings, and hardware. The following methods are used to determine the weight of materials most commonly rigged:

**Pipe** – If the manufacturer has not painted the weight per foot on the pipe then pipe charts can be used to calculate the weight. If a pipe chart is not available the following formula can be used:

**Weight of Steel Pipe =  $\pi \times D \times L \times T \times$  (Unit weight)**

Key	Meaning
$\pi$	3.14
D	Diameter of the pipe
L	Total length of the pipe
T	Thickness of the steel <b>(to convert inches to feet divide by 12)</b>
Unit Weight	The unit weight provided by the manufacturer

Remember, every number in the formula must be in feet and pounds. Because most wall thicknesses are given in inches simply divide the number by 12 to get the equivalent in feet. The following example calculates the weight of a single piece of steel pipe. The pipe is 20 feet long, 3 feet in diameter, and is 0.375 inches thick. Using the above formula and numbers the piece of pipe weighs 1,116 pounds ( $3.14 \times 3' \times 0.03125' \times 189.57 = 1,116$ ).

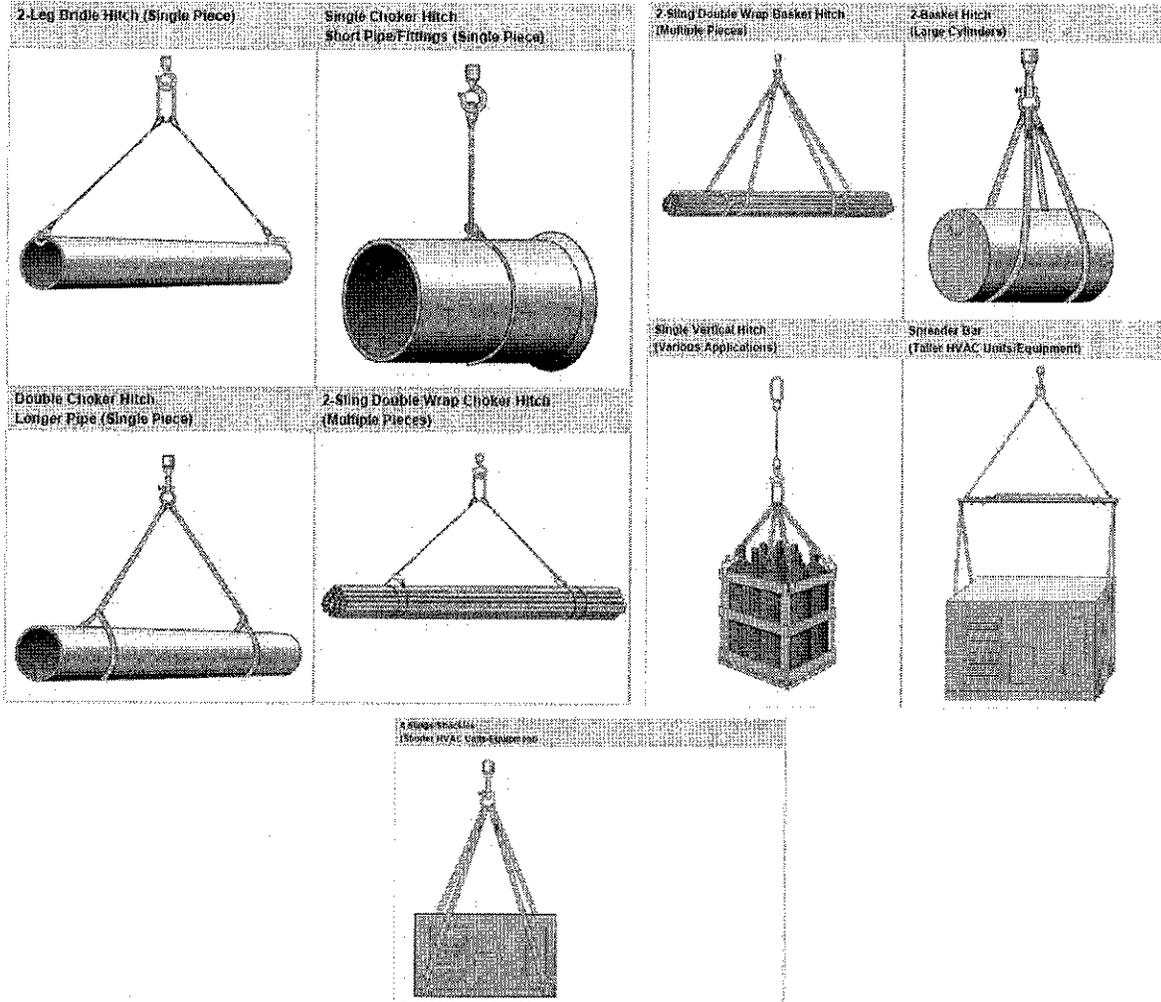
**HVAC Units, Pumps, Fans, Welding Machines, Boilers, etc.** – In most cases the weight will be listed on the equipment. If the weight is not listed contact the manufacturer or supplier and provide them with the brand, model number, and serial number of the equipment. Request the specifications in writing and confirm that the specifications that they send you match the brand and model number of the equipment that will be rigged or lifted.

**Compressed Gas Cylinders** – Determine if the cylinders are empty or full and multiply the number of cylinders by the proper weight. Remember to add the weight of the cage to the total weight of the cylinders.

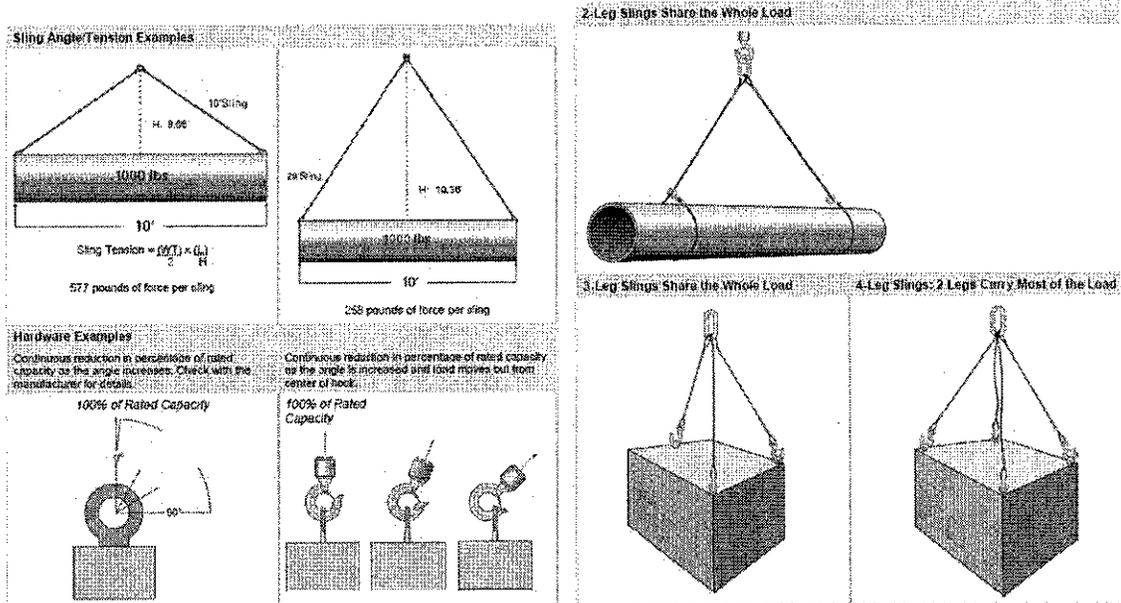
Size	Weight – Empty	Weight – Full
Large	220 pounds	240 pounds

Medium	115 pounds	170 pounds
Small	60 pounds	75 pounds

**Rule # 2 – Determine proper hitch based on load type.** A rigging hitch is used to attach the sling to the load. There are three basic types of hitches: the vertical hitch, choker hitch, and basket hitch. It is critical that the selected hitch support the load. For example, a single choker hitch will not provide full support for a stack of loose pipe. When the lift starts and the sling tightens, it becomes taut around the bottom and sides of the stack, but the pipe on top of the stack remain loose. A safer choice would be a 2-sling wrap choker hitch or a 2-sling double wrap basket hitch, which secures the pipe for lifting. The following illustrations show the proper applications for hitches:



**Rule # 3 – Understanding angles & tension on slings and hardware.** One of the most important items to remember about sling tension is that the lower the angle between the load and the sling, the greater the tension on the sling. Angles also increase the tension on hardware. Hardware's rated capacity decreases when it is pulled from any direction other than vertical. Understanding this is critical when selecting sling and hardware and using them properly.



**Multi-Leg Slings.** Make sure to consider the number of legs on multi-leg slings when determining sling tension and rated capacity.

- Each leg of a two-leg sling shares the load.
- Each leg of a three-leg sling shares the load.
- On a four-leg sling only two of the legs may carry the majority of the load at any one time while the other two simply balance the load.
- Make sure the rated capacity of **each** sling exceeds the weight of the load.

**Rule # 4 – Select the right sling based on load type.** There are several types of slings to choose from. Slings most commonly used are synthetic web slings, synthetic round slings, wire rope slings, and alloy chain slings. A critical consideration when selecting slings is the relationship between the rated capacities of the sling and the type of hitch to be used. The capacity of a sling with a vertical hitch is much different than the sling's capacity in a choker hitch.

When selecting a sling for a particular application, ask yourself:

- Is the sling compatible with the hitch you will use to perform the lift safely?
- Does the design and composition of the sling make it strong enough to perform safely (rated capacity)? Remember to consider reductions for sling angles and the type of hitch you will be using.
- Is the sling in good condition?
- Will the sling keep the load secure and stable?
- Is the sling compatible with the rigging hardware?
- Could the specific rigging/lifting application cause the sling to break or otherwise become damaged during the lift?
- Could the sling damage the materials or equipment that is to be rigged or lifted?

**Rule # 5 – Select the right hardware for the load.** Selecting the right hardware is just as important as selecting the right slings. Hooks, shackles, eyebolts, and U-bolt wire rope clips are the most frequently used rigging hardware. The selection process is the same for hooks, shackles and eyebolts. They are rate based on straight, linear tension. The rated capacity changes when angles are involved just like it does with slings. When selecting hardware ask yourself:

- Does the design and composition of the hardware make it strong enough to perform the work safely (rated capacity)? Keep in mind the reduction in capacity with angles.
- Will the hardware keep the load secure?
- Is the hardware compatible with the sling?
- Is the hardware in good condition?
- Could the hardware damage the materials or equipment that is to be rigged or lifted?

**General.**

- Capacity tables should be used only for pre-project planning purposes.
- Rated capacities of the same sizes and types of hardware may be significantly different from one manufacturer to another.
- When selecting hardware, always use the rated capacity provided by the manufacturer specifically for that piece of hardware.

**Hooks.**

- Hooks used on center (straight up and down with a balanced load) can carry 100 percent of the rated load.
- Hooks that are off center can't carry 100 percent of the rated load. The percentage of the rated load a hook can carry safely depends on how far the hook is off center.
- Identification markings should be shown on each hook. If they are not shown or can't be read, do not use it and immediately take it out of service.

**Shackles.**

- Identification markings should be shown on each shackle. If they are not shown or can't be read, do not use it and immediately take it out of service.

**Wire Rope Clips.**

- Proper positioning of wire rope clips is critical to their performance. The attachment piece that slides over both threaded ends of the U-bolt is referred to as the "Saddle." Remember the phrase, "Never saddle a dead horse." That means the saddle should always be place over the live side of the wire rope. When you bend the rope to attach wire rope clips, the live side is the side *opposite* the end of the wire rope.
- Be sure not to stagger wire rope clips. In doing so you inappropriately "saddle a dead horse".
- Be wary of wire rope slings made with wire rope clips. If you do not know whether the sling had been approved for the specific applications by a qualified engineer, don't use it. Take it out of service immediately until it can be inspected by a qualified engineer.

**Rule # 6 – Inspect each sling before you use it.** Rigging slings wear out over time and use and become dangerous when they no longer safely support their rated capacity. Sling inspections are critical and should be performed before each use. When you come across a defective sling destroy it immediately by cutting the loops of both ends and disposing them in a proper trash receptacle. Never let anyone take them home for personal use. If you are not sure whether any part of the sling is safe to use, do not use it. Place a red tag on it and take it out of service immediately then make arrangements to return it to the warehouse where a qualified person will inspect it.

**Synthetic Sling Inspections.** Look for permanently attached identification tags on each sling. The information should include the manufacturer's name or trademark, code number or stock number, rated capacities based on three types of hitches, angles on which capacities are based, type of material that makes up the sling, and the type of cover material, if different from the core material.

- Carefully inspect synthetic web slings inch by inch to ensure that any damaged areas are identified.
- Check for melting or charring that would indicate exposure to excessive heat or flames, rendering the sling defective.
- Look for cuts, tears, snags or any other fiber damage, which would render the sling defective.
- Carefully observe the stitching throughout the sling looking for broken or worn stitching which would render the sling defective.
- Check for abraded areas, especially where the sling would rub against the load, a fitting, or other hardware, rendering the sling defective.
- Make sure there are no knots in the sling. If a sling has been used with a knot, consider it defective since a knot can permanently weaken the sling.
- If the sling is discolored, look closely for brittle fibers and hardened areas caused by excessive heat or chemicals, which would render the sling defective.
- Carefully inspect any permanently attached fittings. If you discover a fitting that is rusted, corroded, bent, cracked, gouged, worn or has sharp edges that could cut the fiber webbing, the sling is defective.

Defective slings should be destroyed immediately by cutting both ends. Never let anyone take a sling home for personal use.

#### **Wire Rope Slings.**

**Inspections.** Defective slings should be immediately taken out of service. Cut both loop ends of the sling and dispose of. Never let anyone take a sling home for personal use.

- Look for permanently attached identification tags on each sling that states the size, grade, rated capacity, and name of the manufacturer, if the tag is not attached, the sling is defective.
- While wearing protective gloves, carefully inspect wire rope slings inch by inch to ensure that any damaged areas are identified.
- Look for broken wire. If there are five or more broken wires in one rope lay the sling is defective. If there are three or more broken wires in one stand of one rope lay the sling is defective. A rope lay is the length along the rope where one strand makes a complete revolution around the rope.
- Examine the areas of the wire rope that are close to attached fittings. If there are one or more broken wires in any of these areas the sling is defective.
- Look for worn and abraded wires that would render the sling defective.
- Determine whether the wire rope has stretched beyond its normal capacity. If the rope diameter has decreased or the length of a rope lay has increased, the wire rope may be defective and requires inspection by a competent person.
- Look for signs of corrosion, rust, pitting and discoloration. If you see corrosion on the outside of the rope it may have corrosion inside where you can't see it. Consider it defective.
- Check end connections, including thimbles, for damage and wear. Cracks, bends, excessive wear or improperly applied end connections render the sling defective.
- Look at the strands of the wire rope. Strands sticking up away from the rest of the rope render it defective.
- Watch for "bird caging". When wire rope strands begin to unravel or push out away from other strands leaving gaps, the sling is defective.
- Check for heat damage, such as melted areas and burn marks. Detected heat damage renders the sling defective.

**Alloy Steel Chain Slings.** Defective slings should immediately be destroyed to prevent further use.

**Inspections.**

- Look for permanently attached identification tags on each sling that states the size, grade, rated capacity, and name of the manufacturer, if the tag is not attached, the sling is defective.
- Only Alloy Grade 80 or 100 may be used for overhead lifting.
- Carefully inspect each link and hook for bends, cracks, gouges and any other marks that show excessive wear rendering the sling defective.
- Check the links to determine whether they have stretched. Pay close attention to where links are pulled and rubbed against each other and the eye of the hook. If links are binding against each other or binding against the eye of the hook, the links have stretched, rendering the sling defective.
- If the sling has several legs, hang it up to determine whether all the legs are the same lengths. If one or more legs don't match the length of the others, the sling is defective.

**Rule # 7 – Inspect rigging hardware before each use.** Rigging hardware can wear out over time. Worn hardware is dangerous as it no longer safely supports its rated capacity. Hardware inspections are critical and must be performed before each use.

**Inspections.**

- Look for identifications. If missing or illegible remove from service.
- Check for cuts, gouges, corrosion, rust (other than surface rust), and pitting. If any of these defects are present and appear significant, removed from service.
- Check for melted areas, welding arc strikes, welding slag or other hot work markings. If any of these defects are present and appear significant, removed from service.
- Pay special attention to the area of the hardware that bears the most weight of the load.
- Look for bent, twisted, stretched, cracked and broken areas which render the hardware defective.
- Carefully check pieces that include pins. Damaged or stripped threads or pins that don't thread/seat properly, or pins that appear stretched render the hardware defective.

**Rule #8 – Protect slings from cuts and tears.** All types of slings must be protected from sharp edges, especially synthetic web slings. Protect slings by placing padded material between the sling and the edges. Make sure the material is strong enough to support the force of the sharp edge against the sling when lifted.

**Rule #9 – Determine the load's center of gravity.** Center of gravity is the point within the load at which the load balances evenly in all directions. To ensure safe rigging it is important to raise the load directly above its center of gravity whenever possible. If unsure of the center have the operator raise and stop the load a few inches above the ground. If the load tilts signal the operator set it back down and readjust the slings. Follow this trial lift until you are sure you have located the center of gravity.

**Rule #10 – Pay close attention to detail at lift time.** Just before and during the lift there are several details that require special attention, including testing the load, attaching tag lines, identifying potential obstructions, clearing the area, and communicating with the operator.

**Testing the load.** When finished rigging the load, signal the operator to slowly raise it a few inches in order to make final adjustments if necessary. If any issue arises have the operator set the load back down, re-rig it, and then re-test the lift.

- Ensure slings stay in correct position as they tighten around the load.
- Watch for potential sling and hardware failure.
- Make sure load is being raised straight up over its center of gravity and that it doesn't swing.
- Be aware of potential pinch points and keep all hands and bodies clear.
- Ensure no one can get trapped or pinched if the load shifts position during the lift.

**Tag lines.**

- Tag lines should be attached to the load to keep it from rotating or swinging out of control.
- Use the number of tag lines and properly trained line operators necessary to control the load safely.
- Make sure all tag line operators and anyone else in the lift area is wearing a hardhat.

**Potential obstructions.**

- Consider where the load needs to be delivered in relation to where it is before the lift.
- Look for obstructions that may be in the path of the moving load.
- Pay special attention to overhead power lines.
- If you detect a potential obstruction, check with the operator to ensure that he is aware of the obstruction and has chosen a safe path for the load to travel.

**Clear the area.**

- Be sure to clear the lift area and areas under the path the load will travel as much as possible right before the lift.
- Establish a signal for workers in the area so that they will know when a lift is about to occur. The operator can use the equipment's air horn to make the signal or another type of signal can be established.

**Communication with the operator.**

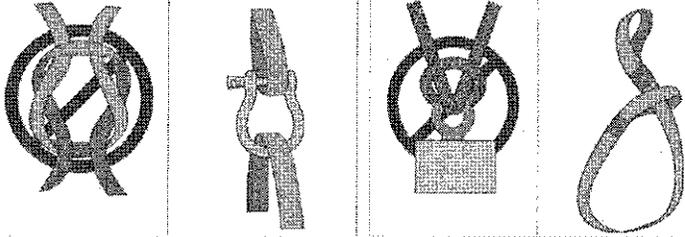
- Standard hand signals for lifting operations should be confirmed between the operator and rigger even if radios are planned to be used. This will ensure continuous communications can exist in the event of radio equipment failure.
- If communications will be verbal, the rigger and operator must first confirm commands before the lift.
- Only one person shall communicate with the operator regardless of the type of communication used. Ensure all other workers involved with the lift understand who that person is.
- See Appendix C for standard hand signals for crane operations.

**Pre-lift reminders for riggers.**

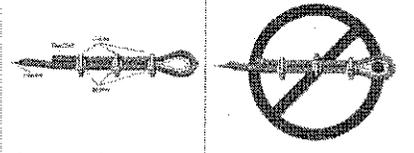
- Check weather conditions before the lift. If extreme, postpone the lift.
- Make sure good communications are in place with the operator and tested.
- Check area for power lines and other obstructions. Ensure operator is aware of any obstructions and has a plan of travel to avoid them.
- Ensure only necessary personnel are in the immediate lift area and are wearing hard hats.
- Rig the load so that it will be lifted straight up to prevent it from swinging.
- Guide the operator to place the boom directly over the load to prevent the load from swinging during the lift.
- Make sure all hands are clear of pinch points when sling(s) start to tighten around the load.
- Watch carefully when the lift starts in case the load does swing.
- Ensure everyone stays out from under the load when it's being lifted and moved.
- Use one or more tag lines to control the load.
- Ensure the receiving area is firm, flat, and free from loose objects that could move around when the load is delivered.
- Signal the operator to deliver the load slowly.
- Guide the load onto the blocking so that it won't be dislodged.
- Ensure everyone's feet are clear of the load prior to final setting.
- Give the stop signal immediately if something doesn't appear to be safe.

**Safety tips for common rigging applications.**

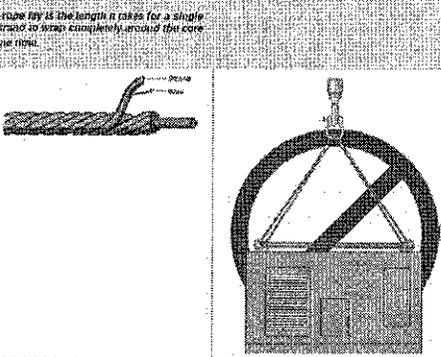
**Ring Safety Tip:**  
 Never use two or three shackle eyes.  
 Always connect the shackle with a shackle.



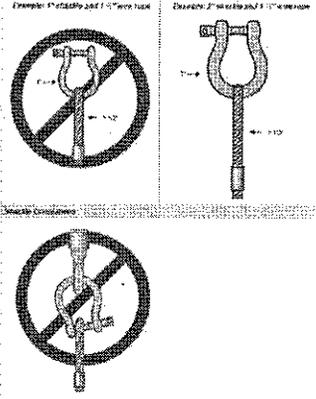
**Never saddle a dead horse.**  
 The shackle eyes pose being "saddled" and of the same size.



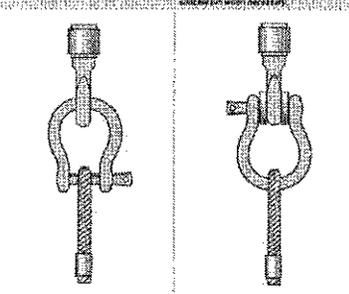
**Wire Rope Safety Tip:**  
 A wire is **dead** live if there are 4 or more broken wires in one rope or shackle. Two broken shackle wires in 1 strand of the rope is **dead**.  
 If rope lay is the length it takes for a single strand to wrap completely around the core one time.



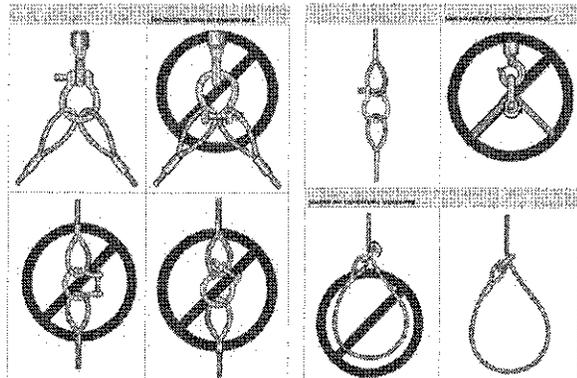
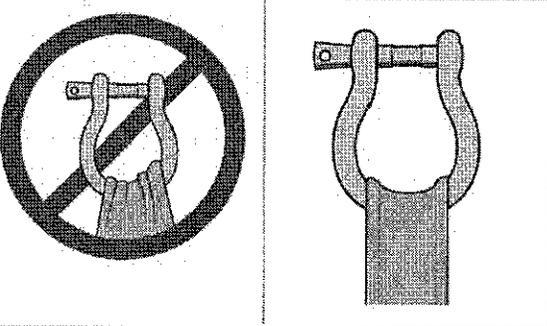
**Shackle Safety Tip:**  
 Never run a shackle directly through the lifting eye/shackle.



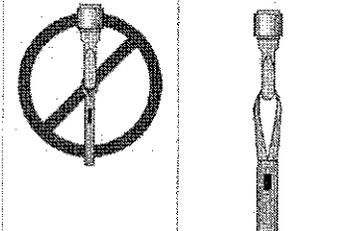
**Shackle Safety Tip:**  
 One shackle in shackle hook center must always be used when necessary.



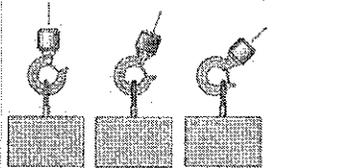
**Shackle Safety Tip:**  
 Never allow the sling to bunch up on the shackle.



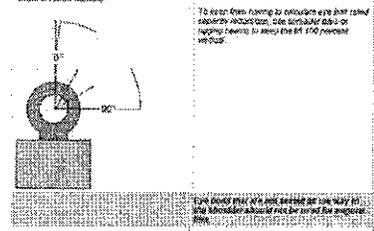
**Hook Safety Tip:**  
 Do not use the hook eye shackle for the load and eye hook.



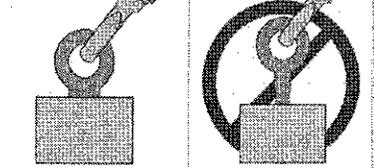
**Hook Safety Tip:**  
 Do not use the hook eye shackle for the load and eye hook.



**Eye Bolt Safety Tip:**  
 Do not use the eye bolt for the load and eye hook.



**Eye Bolt Safety Tip:**  
 Do not use the eye bolt for the load and eye hook.



**Hand signals for crane operations.**

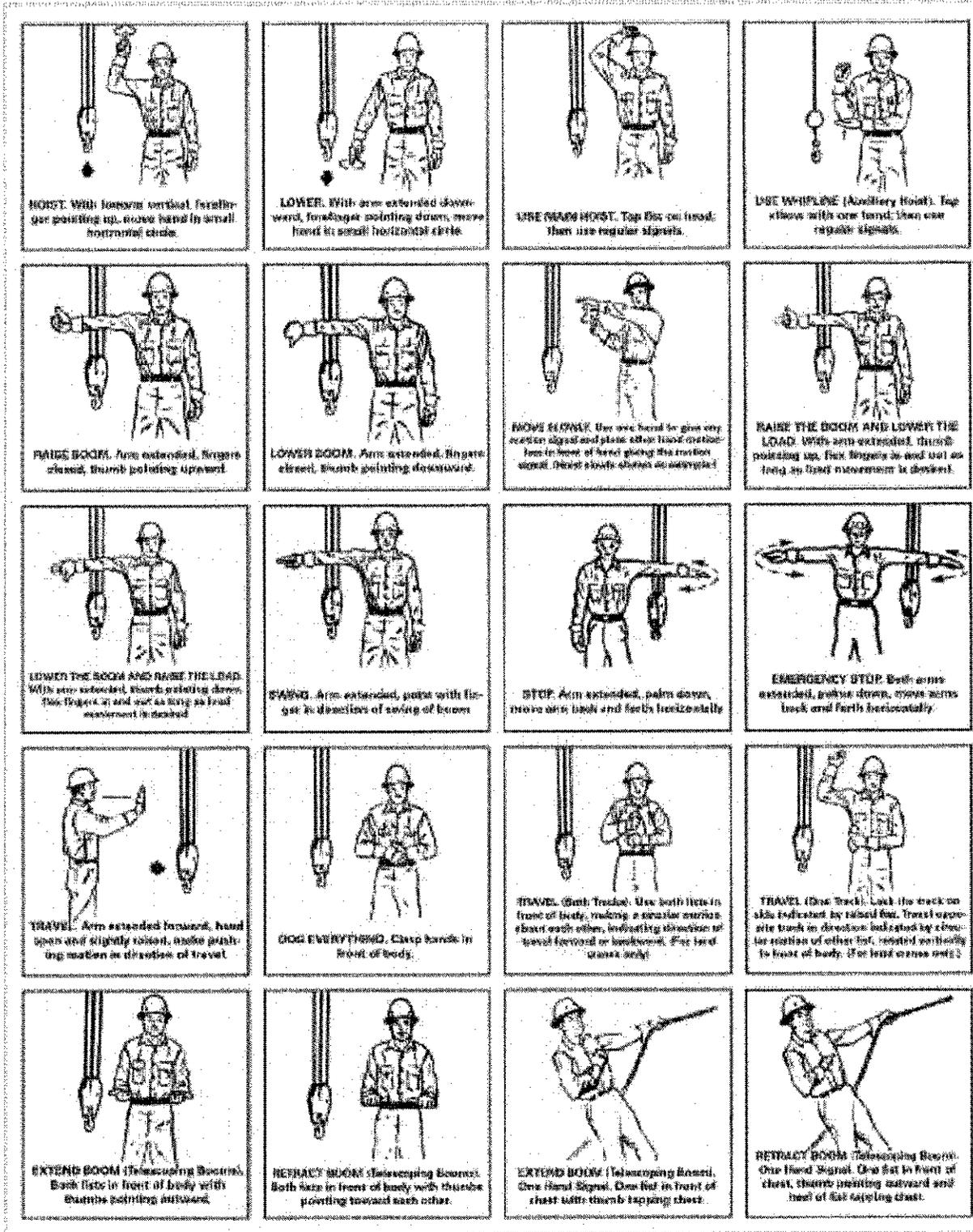


Figure 14 Hand Signals for Crane Operations

XX. Rollover Protective Structures.

1. Rollover protective structures (ROPS) are structures on construction equipment that help protect workers from injury in the event of equipment rollover.
2. General:
  - a. Make sure that the rubber-tired, self-propelled scrapers; rubber-tired front end loaders; rubber-tired dozers; wheel-type agricultural and industrial tractors; crawler tractors; crawler-type loaders; and motor graders you use are equipped with the proper rollover protective structures.
  - b. If an appropriate rollover protective structure is not provided when needed, do not use the equipment. Report the situation to your supervisor.
  - c. Always wear your seat belt when using the equipment.

YY. Scaffolds.

1. Scaffolds are temporary fixed, suspended or mobile elevated platforms used to support workers and materials.
2. General.
  - a. Ensure that an adequate fall prevention system, such as a guardrail system, is in place, or use a fall protection system, such as a personal fall arrest system, before starting work on any scaffold that will place you more than 10 feet above a lower level.
  - b. Competent person must ensure scaffolds are safe prior to use.
  - c. Unsafe equipment or conditions must be tagged out by a Competent Person, and the conditions on the tag must be complied with.
3. Training.
  - a. Training must be provided for all employees working on scaffolds. Get the proper hazard recognition and safety training specific to the type of scaffold you will be using. Training must include hazards (fall, electrical, falling objects), fall protection, use and load capacity.
  - b. Retraining is required in at least the following situations:
    - (1) (1) where changes at the worksite present a hazard about which an employee has not been previously trained; or
    - (2) (2) where changes in the types of scaffolds, fall protection, falling object protection, or other equipment present a hazard about which an employee has not been previously trained; or
    - (3) (3) where inadequacies in an affected employee's work involving scaffolds indicate that the employee has not retained the requisite proficiency.
4. Erection and Disassembly:
  - a. Never attempt to erect or disassemble a scaffold unless you are the designated "competent person" or you are under the direct supervision of the designated "competent person." "Competent person" means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.
5. Mobile Scaffolds:
  - a. Inspect the supporting surface to ensure that it is clean, level and capable of supporting the scaffold and its intended load of workers, materials and equipment. If the surface is not adequate, do not use the scaffold.
  - b. If you need to level the scaffold, use screw jacks with plates or an equivalent mechanism.
  - c. Lock casters and wheels before starting work on a mobile scaffold.
  - d. When moving the scaffold, apply force as close to the base as possible, but never more than five (5) feet above the supporting surface.
  - e. Stabilize the scaffold as much as possible before moving it.
  - f. Never allow a platform to extend out beyond the base support of the scaffold unless outriggers are used to stabilize it.
  - g. Ensure correct size outriggers are installed before adding to the height of the scaffold.
  - h. Never move a mobile scaffold with workers on it unless:
    - (1) The supporting surface is level and free of pits, holes and obstructions

- (2) The height to base width ratio is 2:1 or less, unless the scaffold is designed and constructed to meet nationally recognized stability test requirements
- (3) Outrigger frames, when used, are installed on both sides of the scaffold
- (4) When power systems are used, the propelling force is applied directly to the wheels and does not produce a speed in excess of 1 foot per second
- (5) No worker is on any part of the scaffold that extends out beyond the casters, wheels or other supports
- (6) Each worker on the scaffold is aware that the move is about to take place.

#### ZZ. Signs, Signals and Barricades.

1. Signs, signals and barricades are warning and protective devices used to protect workers from potential hazards and hazardous areas on jobsites and in traffic areas.
2. General:
  - a. Constantly look for warning signs, signals and barricades while working.
  - b. Obey the signs and signals and avoid barricades, remembering that all are there for your protection.
  - c. If you are responsible for installing signs, signals or barricades, ensure they are clearly visible and legible.
  - d. Always remember that:
    - (1) **Danger signs** refer to immediate/imminent hazards.
    - (2) **Caution signs** refer to potential hazards or caution you against unsafe work practices.
    - (3) **Safety instruction signs** are there for injury/incident prevention. They are usually placed around jobsites in strategic locations.
    - (4) **Notice signs** are used for instructional purposes and are also placed around jobsites in strategic locations.
    - (5) **Accident prevention tags** are temporary warning tags usually placed on defective tools or equipment, or used to tag out sources of uncontrolled energy.

#### AAA. Scissor Lifts (See Aerial Lifts).

#### BBB. Silica.

1. Silica is a natural part of the earth's crust and is a component of sand and granite. It can be harmful to humans if inhaled in significant concentrations. Mechanical construction workers can be exposed to silica when drilling through concrete, and may occasionally be exposed to silica dust generated by other trades.
2. General:
  - a. When drilling through concrete, use drills equipped with built-in vacuum collection bags, or keep the dust from becoming airborne with water (the wet method).
  - b. Check with your supervisor before working in any area where you will be exposed to dust generated from jack hammering rock or concrete, concrete mixing, brick and block cutting, sandblasting or other activities that could generate silica dust.
  - c. If you will be required to wear a respirator, make sure you have the proper training and equipment before you start to work.

#### CCC. Stairways.

1. Stairs are a series of steps leading from one level to another.
2. General:
  - a. Make sure there is a stairway or ladder anyplace there is a break in elevation of 19 inches or more, unless there is another suitable means of access available.
  - b. Never use a stairway's skeleton frame structure and/or steps where treads and/or landings *have* not been installed, unless temporary treads and landings are in place.
  - c. Never use a stairway's metal pan landings and treads that aren't filled in with concrete or other permanent materials, unless the pans of the stairs and/or landings *have* been temporarily filled in with wood or other materials.
  - d. Do not use stairways and their landings until the proper fall prevention system has been installed.

- e. Never use stairway landings with unprotected sides and edges. Wait until an adequate guardrail system has been installed.
- f. Do not use any stairway without an adequate handrail.

#### DDD. Toeboards.

1. Toeboards are boards installed on guardrail systems, scaffolds, aerial lifts, leading edges and other areas where objects could fall and become hazardous to workers below.
2. General:
  - a. Make sure toeboards are installed on all guardrail systems, aerial lifts and other areas where tools, materials and/or equipment could be knocked off your working surface to a *level* below.
  - b. Check that toeboards are at least 3 1/2 inches high and made of strong, durable materials.
  - c. Ensure that toeboards do not *have* openings of more than one (1) inch between ends.

#### EEE. Welding, Cutting & Heating.

1. Welding, cutting and heating are methods of melting, cutting or heating metal with electrical current or compressed gases. The biggest concerns with welding, cutting and heating in the mechanical construction industry are electrical shock from electric arc welding, eye hazards, fire hazards and respiratory hazards.
2. General:
  - a. Protect yourself from welding, cutting and brazing hazards by getting familiar with the associated hazards and learning the safe work practices established for worker protection.
  - b. Always wear the appropriate eye protection with the proper shade of lens or lenses.
  - c. Always have an appropriately sized Class ABC fire extinguisher readily available when welding (within 25 feet).
  - d. Be sure not to strike an arc or ignite a torch where flammable/combustible materials or chemicals are present.
3. Electric Arc Welding and Cutting:
  - a. Select cables capable of handling the maximum current requirements.
  - b. Use only manual electrode holders that are specifically designed for arc welding and cutting.
  - c. Carefully inspect the welding cables: electrode holders and any other current-carrying parts to ensure that they are properly insulated and in good condition. If any parts are damaged, immediately take the defective equipment out of service.
  - d. Do not use damaged cables until they have been spliced or repaired by a properly qualified person.
  - e. If a cable has been spliced or repaired, never use it within 10 feet of the electrode holder, unless the material used for the repair has the same or better insulating characteristics than the original insulation.
  - f. Ensure that the ground return cable can safely carry the specified maximum amount of current generated by the arc welding unit.
  - g. Before starting to weld each day, check all ground connections to ensure they are properly connected and have suitable capacity for the specified maximum current.
  - h. Verify that the frames of the electric arc welding units are grounded with a third wire in the cable containing the circuit conductor, or through a separate wire that is grounded at the source of the current.
  - i. Shield arc welding and cutting operations with noncombustible or flameproof screens when necessary to protect other workers from looking directly at the arc.
  - j. Never place an electrode against a cylinder to strike an arc.
4. Gas Welding and Cutting:
  - a. Carefully inspect cylinder valves, regulators, hoses and torches before making any connections. If you see any damage, immediately follow your company's procedure for taking defective equipment out of service.
  - b. Inspect hoses and torches at the start of each work shift.
  - c. Before connecting the regulators, stand to the side of the fuel gas cylinder valve, open it, and close it quickly (cracking). Repeat the process with the oxygen cylinder.

- d. When cracking a fuel gas cylinder or an oxygen cylinder, make sure the escaping gases will not be affected by sparks, flames or other ignition sources.
  - e. Make sure that you can easily tell the difference between fuel gas hoses and oxygen hoses.
  - f. Ensure that it is physically impossible to connect hoses, regulators and torches to the incorrect equipment by using incompatible fittings.
  - g. Inspect the regulators, hoses, torches and all of their connections again after they are connected and the gas has been turned on. Check carefully for leaks and never
  - h. use leaking equipment.
  - i. Use only friction lighters to light torches.
5. Ventilation:
- a. Always ensure that the ventilation is adequate before you start welding or cutting operations.
  - b. Use adequate local ventilation and an airline respirator when performing hot work on: zinc, lead, chromium, cadmium, mercury, beryllium bearing, based or coated materials, or stainless steel (hexavalent chromium), unless air monitoring by a properly qualified person shows no risk of overexposure.

### Driver's Inspection Report

Driver's Name			Date:	
Admin #	Year	Make	Model	Odometer
Inspection Items	OK	N/A	Needs Attention	Remarks
Accident Kit Accident form, camera, registration, insurance card				
Battery				
Back-up alarm				
Belts, hoses Body				
Body				
Brakes				
Exhaust system				
Fire extinguisher				
Fluid levels Brake master cylinder, coolant, oil, steering, transmission, windshield wash				
Fuel system				
Gauges Charging, oil pressure, speedometer, temperature				
Horn				
Lights Brake, parking/tail, head lights, back-up, 4-way flashers, turn signals				
Mirrors				
Seat belts				
Steering				
Storage racks Bottle, ladder, shelving				
Suspension				
Tires Inflation, tread wear, spare				
Windshield/windows/wipers				
State inspection expiration date:			Driver's Signature:	

Figure 15 Driver's Inspection Report

# Job Hazard Analysis

\_\_\_\_\_  
(Title of JHA)

Job Location: \_\_\_\_\_

Prepared By: \_\_\_\_\_ Date: \_\_\_\_\_

Order of Job Steps	Potential Hazards	Procedures
<u>Sample</u> 1. Fill tank with cleaning chemical	<u>Sample</u> Burns to eyes, hands	<u>Sample</u> Wear chemical goggles and rubber gloves.

**PPE Required:** \_\_\_\_\_  
(List PPE)

Figure 16 Job Hazard Analysis



Job Name	
Location	
Inspected by	
Date of Inspection	
Foreman	
Competent Person	

### Jobsite Safety Inspection Checklist

General Items		Yes	No	N/A
1	Potable water & toilets readily available to all workers.			
2	OSHA Job Site Poster posted.			
3	Emergency telephone #s and map to medical center posted.			
4	Emergency exits marked.			
5	Suitable access/egress to building & each floor available.			
6	Temporary lighting & power adequate.			
7	Toolbox talks conducted weekly and on file.			
8	Workers attended CM/GC safety orientation training as required.			
9	General public protected by adequate barricades and signage.			
Personal Protective Equipment		Yes	No	N/A
10	Eye protection worn. Face shield provided and worn when grinding, hammer drilling.			
11	Hearing protection worn when grinding, hammer drilling as required.			
12	Hard hats worn. Hard hat not older than manufacturer's recommendations. (5 years for Fibre-Metal with suspension changed yearly).			
13	Work boots and personal clothing suitable for jobsite.			
14	Welding/cutting helmets, eye protection, gloves, and bibs worn. Correct shield shade # used.			
15	Hand protection worn as required for task at hand.			
16	Respirators/respiratory protection program in place.			
17	Traffic vests provided and worn when/where required.			
Compressed Gas Cylinders		Yes	No	N/A
18	Oxygen /fuel cylinders separated by fire barrier or 20' when not in use for more than 24 hours. Regulators removed and valve caps in place. Cylinders stored upright and secured from tipping.			
19	Cylinders turned off, regulators removed, and valve caps in place when not in use for more than 8 hours. Cylinders secured from tipping.			
20	Compressed gas cylinders labeled.			
21	Hoses and torches free from defects.			
22	Flash arrestors installed and gauges working properly.			
Concrete Construction		Yes	No	N/A
23	Workers are protected from cement dust.			
24	Workers protected from exposed rebar impalement.			
25	Workers protected from over-head concrete work.			
Excavation/Trenches/Shoring		Yes	No	N/A
26	All excavations and trenches 5' or deeper equipped w/protective system. > 20' engineered.			
27	Ladders or other means of quick exit within 25 feet of each worker.			
28	Spoil pile at least 2 feet from edge of excavation or trench.			
29	Fall protection provided for depths 6 feet or greater.			
30	Carbon monoxide machinery exhausted away from trenches.			
31	Type C soil safeguards in place where required.			

<b>Electrical</b>		<b>Yes</b>	<b>No</b>	<b>N/A</b>
32	GFCI program in place.			
33	Sources of electricity such as panel boxes, overhead lines, are marked.			
34	Extension cords are in good condition and kept out of workers' pathways, hallways, doorways, and any entrance/exits as to prevent tripping hazards.			
<b>Fall Protection</b>		<b>Yes</b>	<b>No</b>	<b>N/A</b>
35	Floor openings covered or guarded (if covers – secure and marked)			
36	Workers exposed to falls 6' or more protected with guardrails or guard wires (including ramps and stairways). Guard wire clamp saddles installed properly.			
37	Toe boards installed.			
38	Anchorage points capable of supporting 5,000 pounds per person.			
39	Workers wearing harnesses correctly (D-ring between shoulder blades and leg straps properly tightened).			
40	Lanyards or retractable(s) connected properly.			
41	18.5 feet free-fall distance clear of obstacles when using lanyards.			
42	Double lanyard used when 100% fall protection required.			
<b>First Aid</b>		<b>Yes</b>	<b>No</b>	<b>N/A</b>
43	First aid kits readily available to all workers.			
44	Contents of first aid kits approved by qualified health care provider.			
45	First aid kits include rubber gloves, eye protection, and CPR mask.			
46	Properly trained first aid provider on site.			
<b>Fire Prevention</b>		<b>Yes</b>	<b>No</b>	<b>N/A</b>
47	Flammable/combustible liquids stored away from ignition sources.			
48	Portable containers approved for use, marked, and w/self-closing lids.			
49	Adequate number of properly charged fire extinguishers available.			
50	Extinguishers properly located with current inspection tag.			
51	Flammable/combustible debris/trash kept from welding/cutting operations.			
52	"Hot Work" permits filled out and submitted.			
<b>Hazard Communication</b>		<b>Yes</b>	<b>No</b>	<b>N/A</b>
53	Written Hazard Communication Program in place.			
54	MSDS available for every chemical on list.			
55	Chemical containers properly labeled.			
<b>Housekeeping</b>		<b>Yes</b>	<b>No</b>	<b>N/A</b>
56	Suitable containers available for disposal of trash and debris.			
57	Workers clear of debris trash chutes and/or debris removal process.			
58	Walkways, aisles, hallways and passageways clear of trash, debris and materials.			
59	Slip, trips, and fall hazards removed.			
60	Tools not in use secured in gang boxes.			
61	Equipment not in use stored properly and secured.			
62	Materials stored neatly, away from leading edges, and clear of passageways.			
63	Projecting nails or other sharp edges bent over or protected.			
64	Rebar caps installed on exposed rebar impalement hazards.			
<b>Ladders and Stairways</b>		<b>Yes</b>	<b>No</b>	<b>N/A</b>
65	All ladders non-conductive and slip resistant.			
66	All manufacturer safety labels present and legible.			
67	Ladders inspected daily for defects.			
68	Straight ladders extend 3 feet above landing, pitched 4:1, and secured in place.			
69	Step ladders used in fully opened position with spreaders fully extended and on level surface.			
70	Top two steps of step ladder not used. Worker facing work while on ladder keeping belt buckle within rails of ladder.			
71	Job-built ladders constructed properly.			
72	Stairways equipped with handrails and properly illuminated.			
73	Stairways free of debris, slip, trip and fall hazards.			





505 Narragansett Park Drive • Pawtucket, RI 02861  
 PH: (401) 727-3500 • FAX: (401) 727-3540

# LEAK TEST REPORT

Test Date: \_\_\_\_\_

## PROJECT INFORMATION

JOB #: \_\_\_\_\_ JOB NAME: \_\_\_\_\_  
 LOCATION: \_\_\_\_\_

## SYSTEM TESTED

- CWS       CWR       HWS       HWR       DRAIN, WASTE & VENT  
 STEAM       STORM       DOMESTIC HOT       DOMESTIC COLD  
 MEDICAL GAS       HVAC SYSTEM \_\_\_\_\_       OTHER \_\_\_\_\_

## TEST SPECIFICATIONS / RESULTS

Visual Joint and Component Inspection:       Satisfactory       Unsatisfactory  
 Pre-Leak Test Performed:       N/A       Satisfactory       Unsatisfactory  
 Gauge Calibration Current:       Yes       N/A      Gauge ID#: \_\_\_\_\_

LEAK TEST RESULTS:       Satisfactory       Unsatisfactory  
 Test Pressure: \_\_\_\_\_ psi      System Design Pressure: \_\_\_\_\_ psi  
 Test Medium Temperature: \_\_\_\_\_ °F

Holding Time: \_\_\_\_\_ minutes      Actual Hold Time: \_\_\_\_\_ minutes  
 Code Reference:       ASME B31.1       ASME B31.3       ASME B31.5       ASME B31.9  
 Test Medium Used:       Air       Nitrogen       Water

## WITNESSED BY

Mandatory / Optional	Company	Name	Title
<input type="checkbox"/> / <input type="checkbox"/>	Arden Engineering		
<input type="checkbox"/> / <input type="checkbox"/>	(GC / CM)		
<input type="checkbox"/> / <input type="checkbox"/>	(Owner)		
<input type="checkbox"/> / <input type="checkbox"/>	(Regulatory)		

System Restored By: \_\_\_\_\_ Date: \_\_\_\_\_

Figure 18 Leak Test Report

# Incident Report – Arden Engineering Constructors, LLC

**Project Information:** OCIP \_\_\_\_\_ Non-OCIP \_\_\_\_\_ (check one)

Project Name: \_\_\_\_\_ Date of Report: \_\_\_\_\_  
 Project # \_\_\_\_\_ Date of Incident: \_\_\_\_\_ Time Incident Occurred: \_\_\_\_\_  
 Project Address: \_\_\_\_\_

**Type of Incident:** (check all that apply)

Vehicle Incident     Injury     Fire     Near Miss     Environmental Issue

**Recording Information:** (check all that apply, if unknown leave blank)

OSHA Recordable     Non-recordable comp     RQ Spill or Release     Other  
 Restricted Work     Lost Work Day Case     Vehicle, Equipment or Property Damage > \$5,000

**Employee Information:**

Arden Employee  Yes     No    If Subcontractor, give name & contact person: \_\_\_\_\_

Employee Name: \_\_\_\_\_ Date of Birth: \_\_\_\_\_

Address: \_\_\_\_\_

Phone # \_\_\_\_\_ Marital Status: \_\_\_\_\_ Number of Dependents: \_\_\_\_\_

Total hours employee worked on date of incident: \_\_\_\_\_

Employee's occupation when incident occurred: \_\_\_\_\_

**Part of Body Affected:** Complete only if reporting injury/illness/ (Circle body part. Indicate if Left or Right side w/ L or R)

Ankle	Abdomen	Arm	Back	Buttocks	Chest	Elbow	Eye	Face
Finger	Foot	Groin	Hand	Head	Heart	Hip	Knee	Leg
Nose	Ribs	Scalp	Shoulder	Thigh	Thumb	Toe	Wrist	

**Incident Information:**

Witness(s): \_\_\_\_\_  
 Date Reported: \_\_\_\_\_ Incident believed to be job related?  Yes     No     Unknown

If first aid provided, who was it provided by? \_\_\_\_\_

Type of injury and body part affected? \_\_\_\_\_

Name, address, and phone number of medical provider: \_\_\_\_\_

Brief description of Incident: \_\_\_\_\_

Description of property damage: \_\_\_\_\_

Employee's Immediate Supervisor: \_\_\_\_\_

Prepared By: \_\_\_\_\_ (Print name) (Signature)

Project Manager: \_\_\_\_\_ (Print name) (Signature)

**Fax to the attention of Dorothy Silva-Lowe within 4 hours of injury at 401-727-3540**

Figure 19 Incident Report

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# Supervisor's Accident Report - Arden Engineering

Date of accident: \_\_\_\_\_ Time: \_\_\_\_\_

Injured person's name: \_\_\_\_\_ Department: \_\_\_\_\_

Occupation: \_\_\_\_\_ Apprentice / Journeyman / Foreman / Other  
(Circle One)

Was report to supervisor or first aid delayed? Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, explain: \_\_\_\_\_

## Injured Employee's Section (to be filled out by injured employee)

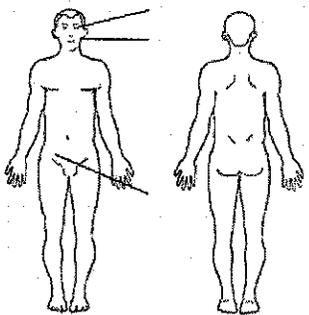
Name (First, Last) _____	Witness name _____
Address (Street, City, State, Zip Code) _____	Witness contact information _____
Phone (Where you can be reached if more information is needed) _____	
Where did the accident occur? (Be specific – what building, floor, etc.) _____	
How many hours for the day had you been working before this occurred? _____	
Do you have supplemental employment? Yes _____ No _____	
Describe your injury: _____ _____ _____ _____	
Describe the incident: _____ _____ _____ _____	<p>Indicate on these figures your affected body part(s) at time of injury:</p> 
Signature: _____ Date: _____	

Figure 20 Supervisor's Accident Report

## Supervisor's Section

Was employee doing something other than required duties at the time of the accident? Yes \_\_\_ No \_\_\_

If yes, what and why? \_\_\_\_\_

Description of accident: (detail what employee was doing; how he/she was doing it; and any physical objects, including weights, tools, machines, structures, or equipment involved).

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Nature / extent of injuries or property damage: \_\_\_\_\_

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Exact location where accident / incident occurred: \_\_\_\_\_

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Witness Information: \_\_\_\_\_

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Description of any attached pictures, drawings, diagrams: \_\_\_\_\_

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Supervisor's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

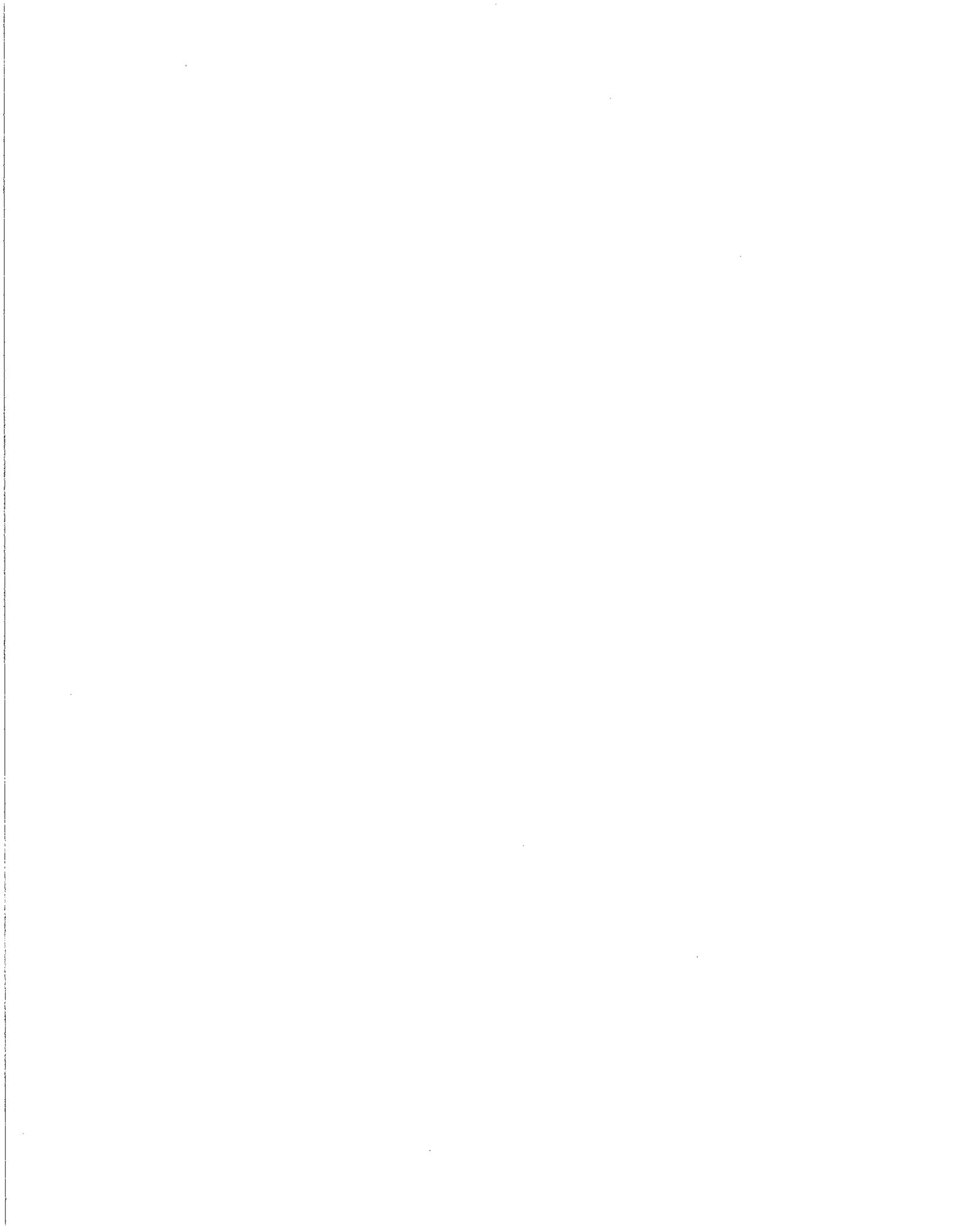
Project Manager's Name: \_\_\_\_\_

Construction Manager Point of Contact: \_\_\_\_\_

Active	Name	Trade	OSHA 30	C.S.E.
	Archetto, Al	HVAC	6/4/07	
	Audette, Mark	Fitter	3/22/07	05/04
	Brierty, Stephen	Fitter		8/23/11
	Campbell, John	Fitter	2/9/08	99
	Campbell, Steven	Fitter	2/12/02	9/20/11
	Carreiro, Jason	HVAC		09/04
	Carter, Paul	HVAC		
	Charron, Alan	Fitter		11/8/04
	Chase, Steven	Fitter	7/9/12	05/04
	Cordeiro, Michael	Fitter		9/10/08
	Dalite, Steven	Fitter	3/19/11	8/23/11
	Deneault, John	Fitter	OSHA 30	7/9/12
	Dimitropolis, Randy	Fitter		
	Evans, Gary	Fitter	4/12/08	9/22/08
	Fitzgerald, William J.	HVAC		
	Fonseca, Mario	Fitter		99
	Forsythe, Donald	Fitter	3/22/07	01
	Gallagher, Eric	Fitter		4/3/06
	Gattnell, Russell	Fitter		11/04
	Gilmond, Andrew Jr	Fitter		Y
	Heroux, Jason	Fitter		
	Heroux, Leonard	HVAC		10/9/07
	Hough, Matthew	Fitter	2/9/08	
	Jenkins, Jason	Fitter	3/19/11	1/10/06
	Keams, James	Fitter	6/9/12	6/9/06
	Lavoie, William	Fitter		98
	Ledoux, Daniel A.	Fitter		
	Logan, Barry	Fitter		4/12/08
	Lowe, Dorothy	Fitter		Y
	Marchette, Joshua	Fitter	4/30/11	6/4/07
	Martin, Lee	Fitter		11/17/04
	McClure, Gordon Jr	Fitter		98
	McClure, Gordon Sr	Fitter		00
	Medeiros, Joseph	Fitter	2/9/08	
	Medeiros, Trevor	Fitter		5/15/09
	Morreau, Alan	Fitter	11/17/07	99
	Nirandone, Robert	Fitter		9/20/11
	Noponen, Matt A.	Fitter		6/4/07
	O'Kelly, Jeffrey	Fitter		11/8/04
	Quellett, Peter	Fitter		7/9/12
	Pawloski, Scott	Fitter		11/9/04
	Pimentel, Joseph	HVAC		
	Randje, Stephen	HVAC		10/9/07
	Raposa, Louis A.	Fitter	4/12/08	
	Raposa, Michael	Fitter	OSHA 500	
	Reid, Brandon M.	Fitter		10/01
	Roussel, Benjamin	HVAC		
	Sanna, John	Fitter	4/12/08	1
	Sanna, Joshua	Fitter		
	Sanna, Steven	Fitter	6/13/12	05/04
	Smith, Aaron	HVAC		
	Spardello, Todd	Fitter	11/7/09	



Steiner, Tyler	HVAC		
Watkins, Steve	Filter	4/30/11	
Zina, Jason	HVAC		4/3/08





# Request for Quote

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
 ONE CAPITOL HILL  
 PROVIDENCE RI 02908

CREATION DATE : 16-OCT-15  
 BID NUMBER: 7549957  
 TITLE: HVAC Services and Repair (MPA-136)  
 BLANKET START : 01-DEC-15  
 BLANKET END : 30-NOV-16  
 BID CLOSING DATE AND TIME: 02-NOV-2015 11:30:00

BUYER: Ohara 2nd, John F  
 PHONE #: 401-574-8125

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Regulation Number:

Line	Description	Quantity	Unit	Unit Price	Total
1	MPA-136 12/1/15-11/30/16 Pipefitter Master 1 Straight Time Hourly Rate Onsite Highest Tier	859.00	Hour	135.00	\$115,965.00
2	MPA-136 12/1/15-11/30/16 Pipefitter Master 1 Straight Time Hourly Rate Onsite Medium Tier	1,516.00	Hour	135.00	\$204,660.00
3	MPA-136 12/1/15-11/30/16 Pipefitter Master 1 Straight Time Hourly Rate Onsite Lowest Tier	960.00	Hour	135.00	\$129,600.00
4	MPA-136 12/1/15-11/30/16 Pipefitter Master 1 Overtime Hourly Rate Onsite Highest Tier	8.00	Hour	180.00	\$1,440.00
5	MPA-136 12/1/15-11/30/16 Pipefitter Master 1 Overtime Hourly Rate Onsite Medium Tier	45.00	Hour	180.00	\$8,100.00
6	MPA-136 12/1/15-11/30/16 Pipefitter Master 1 Overtime Hourly Rate Onsite Lowest Tier	3.00	Hour	180.00	\$540.00
7	MPA-136 12/1/15-11/30/16 Pipefitter Journeyperson 1 Straight Time Hourly Rate Onsite Highest Tier	1.00	Hour	115.00	\$115.00
8	MPA-136 12/1/15-11/30/16 Pipefitter Journeyperson 1 Straight Time Hourly Rate Onsite Medium Tier	1.00	Hour	115.00	\$115.00
9	MPA-136 12/1/15-11/30/16 Pipefitter Journeyperson 1 Straight Time Hourly Rate Onsite Lowest Tier	1.00	Hour	115.00	\$115.00
10	MPA-136 12/1/15-11/30/16 Pipefitter Journeyperson 1 Overtime Hourly Rate Onsite Highest Tier	1.00	Hour	150.00	\$150.00
11	MPA-136 12/1/15-11/30/16 Pipefitter Journeyperson 1 Overtime Hourly Rate Onsite Medium Tier	1.00	Hour	150.00	\$150.00
12	MPA-136 12/1/15-11/30/16 Pipefitter Journeyperson 1 Overtime Hourly Rate Onsite Lowest Tier	1.00	Hour	150.00	\$150.00
13	MPA-136 12/1/15-11/30/16 Apprentice Pipefitter Straight Time Hourly Rate Onsite Highest Tier	1.00	Hour	105.00	\$105.00
14	MPA-136 12/1/15-11/30/16 Apprentice Pipefitter Straight Time Hourly Rate Onsite Medium Tier	1.00	Hour	105.00	\$105.00

It is the Vendor's responsibility to check and download any and all addenda from the RIVIP. This offer may not be considered unless a signed RIVIP generated Bidder Certification Cover Form is attached and the Unit Price column is completed. The signed Certification Cover Form must be attached to the front of the offer



# Request for Quote

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 ONE CAPITOL HILL  
 PROVIDENCE RI 02908

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BUYER: Ohara 2nd, John F  
 PHONE #: 401-574-8125

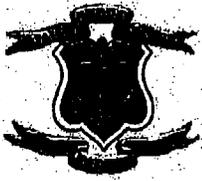
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**Requisition Number:**

Line	Description	Quantity	Unit	Unit Price	Total
15	MPA-136 12/1/15-11/30/16 Apprentlce Pipefitter Straight Time Hourly Rate Onsite Lowest Tier	1.00	Hour	105.00	\$105.00
16	MPA-136 12/1/15-11/30/16 Apprentlce Pipefitter Overtime Hourly Rate Onsite Highest Tier	1.00	Hour	132.00	\$132.00
17	MPA-136 12/1/15-11/30/16 Apprentlce Pipefitter Overtime Hourly Rate Onsite Medium Tier	1.00	Hour	132.00	\$132.00
18	MPA-136 12/1/15-11/30/16 Apprentlce Pipefitter Overtime Hourly Rate Onsite Lowest Tier	1.00	Hour	132.00	\$132.00
19	MPA-136 12/1/15-11/30/16 Refrigeration Master 1 Straight Time Hourly Rate Onsite Highest Tier	1.00	Hour	135.00	\$135.00
20	MPA-136 12/1/15-11/30/16 Refrigeratlon Master 1 Straight Time Hourly Rate Onsite Medium Tier	1.00	Hour	135.00	\$135.00
21	MPA-136 12/1/15-11/30/16 Refrigeration Master 1 Straight Time Hourly Rate Onsite Lowest Tier	1.00	Hour	135.00	\$135.00
22	MPA-136 12/1/15-11/30/16 Refrigeration Master 1 Overtime Hourly Rate Onsite Highest Tler	1.00	Hour	180.00	\$180.00
23	MPA-136 12/1/15-11/30/16 Refrigeratlon Master 1 Overtime Hourly Rate Onsite Medium Tier	1.00	Hour	180.00	\$180.00
24	MPA-136 12/1/15-11/30/16 Refrigeration Master 1 Overtime Hourly Rate Onsite Lowest Tler	1.00	Hour	180.00	\$180.00
25	MPA-136 12/1/15-11/30/16 Refrigeration Journeyperson 1 Straight Time Hourly Rate Onsite Highest Tier	1.00	Hour	115.00	\$115.00
26	MPA-136 12/1/15-11/30/16 Refrigeration Journeyperson 1 Straight Time Hourly Rate Onsite Medium Tier	1.00	Hour	115.00	\$115.00
27	MPA-136 12/1/15-11/30/16 Refrigeratlon Journeyperson 1 Straight Time Hourly Rate Onsite Lowest Tier	1.00	Hour	115.00	\$115.00
28	MPA-136 12/1/15-11/30/16 Refrigeratlon Journeyperson 1 Overtime Hourly Rate Onsite Highest Tier	1.00	Hour	150.00	\$150.00
29	MPA-136 12/1/15-11/30/16 Refrigeration Journeyperson 1	1.00	Hour	150.00	\$150.00

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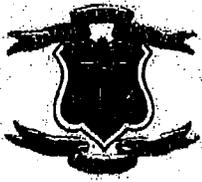
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Requisition Number:

Line	Description	Quantity	Unit	Unit Price	Total
	Overtime Hourly Rate Onsite Medium Tier				
30	MPA-136 12/1/15-11/30/16 Refrigeration Journey person 1 Overtime Hourly Rate Onsite Lowest Tier	1.00	Hour	150.00	\$150.00
31	MPA-136 12/1/15-11/30/16 Apprentice Refrigeration Straight Time Hourly Rate Onsite Highest Tier	1.00	Hour	105.00	\$105.00
32	MPA-136 12/1/15-11/30/16 Apprentice Refrigeration Straight Time Hourly Rate Onsite Medium Tier	1.00	Hour	105.00	\$105.00
33	MPA-136 12/1/15-11/30/16 Apprentice Refrigeration Straight Time Hourly Rate Onsite Lowest Tier	1.00	Hour	105.00	\$105.00
34	MPA-136 12/1/15-11/30/16 Apprentice Refrigeration Overtime Hourly Rate Onsite Highest Tier	1.00	Hour	132.00	\$132.00
35	MPA-136 12/1/15-11/30/16 Apprentice Refrigeration Overtime Hourly Rate Onsite Medium Tier	1.00	Hour	132.00	\$132.00
36	MPA-136 12/1/15-11/30/16 Apprentice Refrigeration Overtime Hourly Rate Onsite Lowest Tier	1.00	Hour	132.00	\$132.00
37	MPA-136 12/1/15-11/30/16 Sheet Metal 1 Straight Time Hourly Rate Onsite Highest Tier	1.00	Hour	135.00	\$135.00
38	MPA-136 12/1/15-11/30/16 Sheet Metal 1 Straight Time Hourly Rate Onsite Medium Tier	1.00	Hour	135.00	\$135.00
39	MPA-136 12/1/15-11/30/16 Sheet Metal 1 Straight Time Hourly Rate Onsite Lowest Tier	1.00	Hour	135.00	\$135.00
40	MPA-136 12/1/15-11/30/16 Sheet Metal 1 Overtime Hourly Rate Onsite Highest Tier	1.00	Hour	180.00	\$180.00
41	MPA-136 12/1/15-11/30/16 Sheet Metal 1 Overtime Hourly Rate Onsite Medium Tier	1.00	Hour	180.00	\$180.00
42	MPA-136 12/1/15-11/30/16 Sheet Metal 1 Overtime Hourly Rate Onsite Lowest Tier	1.00	Hour	180.00	\$180.00
43	MPA-136 12/1/15-11/30/16 Sheet Metal Journey person 1	1.00	Hour	115.00	\$115.00

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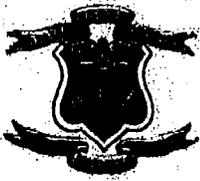
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Requisition Number:

Line	Description	Quantity	Unit	Unit Price	Total
	Straight Time Hourly Rate Onsite Highest Tier				
44	MPA-136 12/1/15-11/30/16 Sheet Metal Journey person 1 Straight Time Hourly Rate Onsite Medium Tier	1.00	Hour	115.00	\$115.00
45	MPA-136 12/1/15-11/30/16 Sheet Metal Journey person 1 Straight Time Hourly Rate Onsite Lowest Tier	1.00	Hour	115.00	\$115.00
46	MPA-136 12/1/15-11/30/16 Sheet Metal Journey person 1 Overtime Hourly Rate Onsite Highest Tier	1.00	Hour	150.00	\$150.00
47	MPA-136 12/1/15-11/30/16 Sheet Metal Journey person 1 Overtime Hourly Rate Onsite Medium Tier	1.00	Hour	150.00	\$150.00
48	MPA-136 12/1/15-11/30/16 Sheet Metal Journey person 1 Overtime Hourly Rate Onsite Lowest Tier	1.00	Hour	150.00	\$150.00
49	MPA-136 12/1/15-11/30/16 Apprentice Sheet Metal Straight Time Hourly Rate Onsite Highest Tier	1.00	Hour	105.00	\$105.00
50	MPA-136 12/1/15-11/30/16 Apprentice Sheet Metal Straight Time Hourly Rate Onsite Medium Tier	1.00	Hour	105.00	\$105.00
51	MPA-136 12/1/15-11/30/16 Apprentice Sheet Metal Straight Time Hourly Rate Onsite Lowest Tier	1.00	Hour	105.00	\$105.00
52	MPA-136 12/1/15-11/30/16 Apprentice Sheet Metal Overtime Hourly Rate Onsite Highest Tier	1.00	Hour	132.00	\$132.00
53	MPA-136 12/1/15-11/30/16 Apprentice Sheet Metal Overtime Hourly Rate Onsite Medium Tier	1.00	Hour	132.00	\$132.00
54	MPA-136 12/1/15-11/30/16 Apprentice Sheet Metal Overtime Hourly Rate Onsite Lowest Tier	1.00	Hour	132.00	\$132.00
55	MPA-136 12/1/15-11/30/16 Major Equipment (with operator applicable) CRANE	1.00	Hour	750.00	\$750.00
	Rates for items 55 through 58 shall include the following.				

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# Request for Quote

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 ONE CAPITOL HILL  
 PROVIDENCE RI 02908

BUYER: Ohara 2nd, John F  
 PHONE #: 401-574-8125

CREATION DATE : 16-OCT-15  
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Requisition Number:

Line	Description	Quantity	Unit	Unit Price	Total
	All rates shall be inclusive without limitations, wages, benefits, vehicle, fuel, tools, mobilization and demobilization, supervision, insurance, all licenses, permits, overhead and profit and all other requirements necessary for the commencement, performance and completion of the Work.				
56	MPA-136 12/1/15-11/30/16 Major Equipment (with operator applicable) CRANE	1.00	Day	1,200.00	\$1,200.00
57	MPA-136 12/1/15-11/30/16 Major Equipment (with operator applicable) CRANE	1.00	Week	6000.00	\$6,000.00
58	MPA-136 12/1/15-11/30/16 Major Equipment (with operator applicable) CRANE  Materials are to be provided at COST plus the following (applicable) fee for overhead, pickup and delivery. No additional charges will be acceptable.  \$0-500 NO FEE \$501-750 \$75.00 \$751-1000 \$96.00 \$1001-1500 \$125.00 \$1501-2500 \$180.00 \$2501-5000 \$300.00 \$5001-7500 \$438.00 Over \$7501. \$525.00.  Acknowledgement of fee structure on materials.	1.00	Month	24,000	\$24,000.00

Delivery: upon receipt of PO

Terms of Payment: net 30 days

It is the Vendor's responsibility to check and download any and all addenda from the RIVIP. This offer may not be considered unless a signed RIVIP generated Bidder Certification Cover Form is attached and the Unit Price column is completed. The signed Certification Cover Form must be attached to the front of the offer