

The suggested course of study for the  
**Commercial and Industrial Insulator**

On-the-Job Learning and Related Technical Instruction  
are outlined below:

**DOT: 863.381.014**

<b>PERIOD #</b>	<b>COURSE NAME</b>	<b>OJL MINIMUM HOURS</b>	<b>RTI MINIMUM HOURS</b>
First	Labor History/Mathematics	900	80
Second	Fundamentals of Insulation I	900	80
Third	Fundamentals of Insulation II	900	80
Fourth	Construction Safety	900	80
Fifth	Advanced Metal Jacketing I	900	80
Sixth	Advanced Metal Jacketing II	900	80
Seventh	Blueprints, Codes and Specifications	900	80
Eighth	Removable Insulation Design	900	80
Ninth	Effective Supervision/Construction Safety	900	80
Tenth	Curriculum Review	900	80
		<b>9000</b>	<b>800</b>

## **Commercial and Industrial Insulator Program**

The Commercial and Industrial Insulator Program is co-sponsored by the **International Association of Heat and Frost Insulators and Allied Workers (IAHFIAW) JAC (LU14)** to meet the ever-changing needs of the industry and the affiliates it serves. The apprenticeship program ensures that students will learn the theoretical knowledge and the practical skills necessary to be a successful Commercial and Industrial Insulator. During this program of study, students will successfully complete the required IAHFIAW JAC (LU14) curriculum in both core and craft specific areas. Student's successfully completing this program will apply their skills and abilities as a Commercial & Industrial Insulator.

### **Description of Occupation**

A Commercial & Industrial Insulator is responsible for selecting, cutting, installing, replacing, and removing all types of mechanical system insulation. Work in the insulation field can include both industrial and commercial projects.

Commercial residential projects may include HVAC system and domestic water piping to improve energy efficiency; using various techniques and materials to provide energy savings. Commercial projects; such as schools, hospitals, hotels, restaurants and entertainment venues benefit when their mechanical systems are adequately insulated.

Industrial projects may include: Petrochemical refineries, Paper Mills, Nuclear and Fossil Fuel Power Houses, various manufacturing facilities and sea-going ships.

Insulation serves many uses in modern life. Insulated mechanical systems provide warmed or cooled air and provides good condensation and sound control qualities. Insulation workers install and replace the materials used to insulate building mechanical systems to help control and maintain the temperatures in buildings.

Insulators are continuously promoting the application of green technology. The Insulator trade is specifically focused on energy efficient retrofitting projects as well as the design and installation of energy efficient mechanical systems in both industrial and commercial applications.

### **Training/Skill Set**

Skills needed to become an Insulator include manual dexterity, eye-hand coordination, physical fitness, and a good sense of balance. The ability to solve arithmetic problems quickly and accurately also is required. A good work history or military service is viewed favorably by employers.

The IAHFIAW JAC (LU14) curriculum and training will provide the skills, knowledge, and abilities needed to meet the needs of the industry and to ensure that each worker is equipped to use the technology, materials, and applicable methods of commercial and industrial insulation as well as adhering to all quality and safety standards on the job. Insulators use hand tools such as knives, trowels, metal shears, rulers, wrenches, saws, scissors and wing dividers, as well as power tools such as saws, drills, cutters, and grinders. An increasing number of Insulators use computers in the shop or at the jobsite to improve their layout work and record keeping.

Also, due to an increase in environmental concerns there is a tendency for new structures to meet Leadership in Energy and Environmental Design (LEED) guidelines. The Insulator needs to have knowledge of high performance insulation products, solar trends, and building mechanical systems.

Insulators learn through on-the-job training and by working as an apprentice alongside an experienced journey person. This is accomplished through a combination of related technical instruction as delineated in the National Guidelines: Standards of Apprenticeship.

### Working Environment

Mechanical insulators work both indoors and outdoors.

Employment in the insulation trade is less seasonal than in most of the construction crafts. Such activities as freezing mechanical systems in the winter and failing air conditioning systems in the summer increase the work load depending on extremes of weather. Employment in retail retrofit outlets also tends to be stable.

Insulators often work indoors in shop/plant type surroundings. However, they will occasionally be placed on outdoor jobsites. They must be prepared to lift heavy boxes of insulation and work on scaffolding, swing stages, mast climbers, and self-propelled platforms such as scissor and boom lifts; sometimes at great heights. Insulators do a considerable amount of bending, kneeling, lifting, and standing during the fabrication and installation process. They also work in various confined spaces.

Insulators generally work on one of several types of projects.

Commercial projects may involve hotels, hospitals, libraries, stores and offices.

Industrial projects may include refineries, powerhouses and manufacturing plants.

Emphasized early in the apprentice's career is adherence to and knowledge of OSHA standards for asbestos abatement; mold remediation; fire and smoke penetrations;

personal safety; safety on the jobsite; and proper handling of tools, materials and equipment. Additionally, the student will discuss safe work practices when working with insulation materials and various obstacles that may be encountered on the job, such as moving and lifting heavy materials including rolls of sheet metal and other materials and equipment.

### **Program Level Competencies**

With reference to each of the respective areas of the Insulation trade, apprentices successfully completing this program will be able to:

#### ***Insulator***

- Recognize and abate hazards in shop / plant and jobsites
- Identify trade-related materials and applications.
- Interpret drawings related to the insulation trade.
- Comprehend and demonstrate soft skills learned and needed for the industry
- Apply trade math calculations.
- Demonstrate the proper sealants and methods used in the insulation trade
- Demonstrate the proper fabrication, assembly, and installation methods of the insulation industry, including sheet metal, PVC jacketing and other protective weatherproofings.
- Apply the standards of quality control and quality assurance in the insulation industry.
- Apply green technology as appropriate in the insulation trade.

### **Suggested Course of Study for the Insulation Curriculum**

The IAHFIAW JAC (LU14) Apprenticeship Program is designed as a five-year program of study.

While participating in the Insulation professional program of study, apprentices will be exposed to a minimum of 800 hours (unless advanced placement is approved and awarded) of Related Technical Instruction (RTI) in the following disciplines:

- Insulator Health & Safety
- Introduction to the Commercial & Industrial Insulation Trade
- Introduction to Blueprints
- Soft Skills of the Insulation Trade
- Mathematics for the Insulator Trade
- Introduction to Sealants, Mastics and Adhesives
- Sheet Metal & PVC: Fabrication Techniques
- Thermal, Cryogenic and Refractory: Installation Techniques

## Competencies for the Commercial and Industrial Insulator

Commercial and Industrial Insulator		
First Period	Labor History/Mathematics	
	<i>On-the-Job Learning (OJL)</i>	<i>Related Technical Instruction (RTI)</i>
	<ul style="list-style-type: none"> <li>• Don (Put On), Doff ( Remove), Inspect, and maintain the proper PPE that should be worn during insulation application including, but not limited to:               <ul style="list-style-type: none"> <li>• Head</li> <li>• Face</li> <li>• Eyes</li> <li>• Ears</li> <li>• Hands</li> <li>• Body</li> <li>• Feet</li> <li>• Respiratory</li> </ul> </li> <li>• Perform a job analysis for safe working conditions, including:               <ul style="list-style-type: none"> <li>• Attend pre-job safety meetings.</li> <li>• Adhere to site specific safety rules and federal regulations.</li> <li>• Read and interpret SDS.</li> <li>• Establish and maintain a safe working perimeter.</li> </ul> </li> <li>• Maintain clean work areas (housekeeping).</li> <li>• Demonstrate proper and safe handling of materials.</li> <li>• Identify the locations of First Aid and Fire Equipment.</li> <li>• Demonstrate basic safety awareness practices.</li> <li>• Demonstrate the process by which to erect and dismantle a scaffolding system.</li> <li>• Don and doff a personal fall arrest body harness and lanyard system.</li> <li>• Recognize potential situations that pertain to damaged equipment or unsafe work practices and follow proper protocol for reporting and correcting the situation.</li> </ul>	<ul style="list-style-type: none"> <li>• Recognize the importance of Labor History</li> <li>• Describe the role played by those who came before us.</li> <li>• Identify various organizations from the past and their contributions to present day labor:               <ul style="list-style-type: none"> <li>• Philadelphia Cordwainers</li> <li>• Knights of Labor</li> <li>• American Federation of Labor</li> <li>• Congress of Industrial Organization</li> <li>• AFL-CIO Building &amp; Construction Trades</li> <li>• International Association of Heat &amp; Frost Insulators &amp; Allied Workers</li> <li>• Philadelphia Building and Construction Trades Council</li> <li>• Local 14, Philadelphia Heat &amp; Frost Insulators &amp; Allied Workers Union</li> </ul> </li> <li>• Identify the historical reasons for unionization.</li> <li>• Describe the strengths and weaknesses of the labor movement in the U.S.</li> <li>• Describe the union structure and its activities.</li> <li>• Explain how unions promote the trade and serve its members</li> <li>• Understand the union’s impact on economic issues, corporation, productivity, and distribution of wealth.</li> <li>• Identify and explain the most significant labor laws of the 1900s.</li> <li>• Analyze the impact the labor movement has had on social and political reform.</li> <li>• Evaluate the IAHFIAW role in the labor movement from 1903 to the present.</li> <li>• Investigate the current state of the union’s market share.</li> <li>• Discuss the personal rewards and consequences associated with the union’s market share.</li> <li>• Describe successful strategies for unions to regain a market share in the construction industry.</li> <li>• Identify and describe what the union provides on an ongoing basis to its members and</li> </ul>
	<ul style="list-style-type: none"> <li>• Job Site Mathematics - Add, subtract, multiply, and</li> </ul>	

	<p>divide whole numbers, with and without a calculator on the jobsite.</p> <ul style="list-style-type: none"> <li>• Add, subtract, multiply, and divide fractions at jobsite</li> <li>• Add, subtract, multiply, and divide decimals, with and without a calculator on jobsite</li> <li>• Convert decimals to percentages and percentages to decimals at jobsite</li> <li>• Convert fractions to decimals and decimals to fractions at jobsite</li> <li>• Explain what the metric system is and how it is important in the construction trade at jobsite</li> <li>• Recognize and use metric units of length, weight, volume, and temperature at jobsite</li> <li>• Recognize some of the basic shapes used in the construction industry and apply basic geometry to measure them at jobsite.</li> </ul>	<p>affiliates.</p> <ul style="list-style-type: none"> <li>• Identify the roles and responsibilities of the end users, contractors, union, and rank and file.</li> <li>• Articulate the value that the union provides its members and affiliates.</li> <li>• Discuss the generational changes in rank and file attitudes and behaviors.</li> <li>• Define the alcohol and drug policy of the apprenticeship school and explain where members can go for help if they have a problem.</li> <li>• Identify the symptoms of alcoholism and addiction.</li> <li>• Explain why addiction is a disease.</li> <li>• Define the DOT mandates for drug testing.</li> <li>• Identify Important Labor Laws and how they relate to the politics of their time.</li> <li>• Explain the importance of Mathematics in the insulation trade.</li> <li>• Addition, Subtraction, Multiplication and Division of Whole Numbers and Fractions.</li> <li>• Addition, Subtraction, Multiplication and Division of decimal numbers.</li> <li>• Plane Geometry</li> <li>• Understand the process and importance for determining Areas and Volumes accurately.</li> <li>• Recognize and understand basic line development.</li> <li>• Convert decimals to percentages and percentages to decimals.</li> <li>• Convert fractions to decimals and decimals to fractions.</li> <li>• Explain what the metric system is and how it is important in the construction trade.</li> </ul>

Second Period	Fundamentals of Insulation I	
	<i>On-the-Job Learning (OJL)</i>	<i>Related Technical Instruction (RTI)</i>
	<ul style="list-style-type: none"> <li>• Demonstrate the characteristics of a professional Insulator, including:               <ul style="list-style-type: none"> <li>• Exhibit suitable appearance and personal hygiene.</li> <li>• Exhibit proper attitude and behavior on job sites including new construction and in occupied buildings.</li> <li>• Deal with difficult customers in a professional and courteous manner.</li> <li>• Interpret written and verbal instructions.</li> <li>• Recognize the importance of cooperation and interaction with related trades on a job site.</li> </ul> </li> <li>• Demonstrate the use of insulator hand tools, including but not limited to:               <ul style="list-style-type: none"> <li>• General Tools (rules, straight edges, protractor, dividers)</li> <li>• Squares</li> <li>• Levels and Chalk Lines</li> <li>• Saws – Pruning and Finishing</li> <li>• Screwdrivers</li> <li>• Specialty/Drill Bits and Fasteners</li> <li>• Caulking Guns</li> <li>• Knives (utility, putty, boning, etc.)</li> <li>• Pliers and Channel Locks</li> <li>• Metal Cutters – Shears to Scissors</li> <li>• Hacksaws</li> <li>• Trowels – Pointer, Throat, Bullnose, English and Broad.</li> <li>• Hammers, Mallets and Shaping tools.</li> <li>• Pry Bars</li> <li>• Rivet Guns, Pin &amp; Stud Guns</li> <li>• Application Assistants – Bungee Cords, Wires and Blocking Rubbers.</li> <li>• Wrenches</li> </ul> </li> <li>• Demonstrate the proper use of insulation hand tools, material application and use of power tools.</li> <li>• Select the proper tools to safely and correctly apply insulations.</li> <li>• Demonstrate the techniques used to safely operate power lifts.</li> <li>• Demonstrate the process for proper removal of various insulation materials, including asbestos.</li> <li>• Demonstrate the process for cleaning and housekeeping.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify and explain basic terminology used in insulation.</li> <li>• Identify various types of insulation and their proper application.</li> <li>• Describe working conditions in the insulation trade.</li> <li>• Identify the career options and advancement opportunities in the insulation trade.</li> <li>• Describe reasons for insulation.</li> <li>• Identify the three types of heat transfer.</li> <li>• Identify the appropriate PPE needed when applying insulation.</li> <li>• Identify hand tools used in the insulation trade.</li> <li>• Describe custody, care, and maintenance of tools and equipment.</li> <li>• Identify recognized temperature ranges (Cryogenic, Thermal &amp; Refractory) and the different materials associated with each temperature range.</li> <li>• Maintenance and Preservation of Vapor Barriers.</li> <li>• Describe the types of mastics and adhesives used in the insulation industry and where, when and how they are used.</li> <li>• Describe the importance of properly storing insulation materials.</li> <li>• Describe the proper technique (ergonomics) for lifting and transporting insulation materials.</li> <li>• Recognize the importance of Personal Protective Equipment.</li> <li>• Describe the characteristics of Fibrous, Granular and Cellular materials.</li> <li>• Describe the hazards associated with each type of material.</li> <li>• Discuss the importance of quality workmanship.</li> </ul>

Third Period	Fundamentals of Insulation II	
	<i>On-the-Job Learning (OJL)</i>	<i>Related Technical Instruction (RTI)</i>
	<ul style="list-style-type: none"> <li>• Continue to demonstrate the characteristics of a professional Insulator.</li> <li>• Continue to demonstrate the use of insulator hand tools, including but not limited to:               <ul style="list-style-type: none"> <li>• General Tools (rules, straight edges, protractor, dividers)</li> <li>• Squares</li> <li>• Levels and Chalk Lines</li> <li>• Saws – Pruning and Finishing</li> <li>• Screwdrivers</li> <li>• Specialty/Drill Bits and Fasteners</li> <li>• Caulking Guns</li> <li>• Knives (utility, putty, boning, etc.)</li> <li>• Pliers and Channel Locks</li> <li>• Metal Cutters – Shears to Scissors</li> <li>• Hacksaws</li> <li>• Trowels – Pointer, Throat, Bullnose, English and Broad.</li> <li>• Hammers, Mallets and Shaping tools.</li> <li>• Pry Bars</li> <li>• Rivet Guns, Pin &amp; Stud Guns</li> <li>• Application Assistants – Bungee Cords, Wires and Blocking Rubbers.</li> <li>• Wrenches</li> </ul> </li> <li>• Select the proper tools to safely and correctly apply insulations.</li> <li>• Demonstrate the techniques used to safely operate power lifts.</li> <li>• Demonstrate the process for proper removal of various insulation materials, including asbestos.</li> <li>• Demonstrate the process for cleaning and housekeeping.</li> </ul>	<ul style="list-style-type: none"> <li>• Continue to identify, explain and understand advanced terminology used in insulation.</li> <li>• Identify various types of insulation, their temperature ranges and various application techniques.</li> <li>• Recognize working conditions in the insulation trade vary with consideration for weather and temperature variations.</li> <li>• Describe reasons for various types of insulation and how they retard heat transfer.</li> <li>• Identify the appropriate mastics, sealants and adhesives.</li> <li>• Identify specialized hand tools used in the insulation trade and demonstrate their use.</li> <li>• Describe custody, care, and maintenance of tools and equipment.</li> <li>• Identify specialized application techniques required to properly insulate Cryogenic, Thermal &amp; Refractory temperature ranges.</li> <li>• Describe the application perimeters (temperature range) of mastics and adhesives used in insulation industry and where, when and how they are used.</li> <li>• Describe the importance of properly storing insulation materials.</li> <li>• Describe the proper technique (ergonomics) for lifting and transporting insulation materials.</li> <li>• Recognize the importance of Personal Protective Equipment.</li> <li>• Describe the characteristics and application specifications of Fibrous, Granular and Cellular materials.</li> <li>• Describe the hazards associated with each type of material.</li> <li>• Discuss the importance of quality workmanship.</li> </ul>

Fourth Period	Construction Safety and Awareness	
	<i>On-the-Job Learning (OJL)</i>	<i>Related Technical Instruction (RTI)</i>
	<ul style="list-style-type: none"> <li>• Put On, Remove, Inspect, and maintain the proper PPE that should be worn during insulation application including, but not limited to:               <ul style="list-style-type: none"> <li>• Head</li> <li>• Face</li> <li>• Eyes</li> <li>• Ears</li> <li>• Hands</li> <li>• Body</li> <li>• Feet</li> <li>• Respiratory</li> </ul> </li> <li>• Perform a job analysis for safe working conditions, including:               <ul style="list-style-type: none"> <li>• Attend pre-job safety meetings.</li> <li>• Adhere to site specific safety rules and federal regulations.</li> <li>• Read and interpret SDS.</li> <li>• Establish and maintain a safe working perimeter.</li> </ul> </li> <li>• Maintain clean work areas (housekeeping).</li> <li>• Demonstrate proper and safe handling of insulation materials.</li> <li>• Identify the locations of First Aid and Fire Equipment.</li> <li>• Demonstrate basic safety awareness practices.</li> <li>• Demonstrate the process by which to erect and dismantle a scaffolding system.</li> <li>• Don and doff a personal fall arrest body harness and lanyard system.</li> <li>• Recognize dangerous situations that pertain to damaged equipment or unsafe work practices and follow proper protocol for reporting and correcting the situation.</li> </ul>	<ul style="list-style-type: none"> <li>• Recognize the important areas of OSHA in specific terms: Ladder safety, high reaches and Confined spaces.</li> <li>• Understand the role of employer, supplier, and worker in the education of safety for workers.</li> <li>• Identify site and job specific hazards and policies of OSHA 29CFR1926 and 29CFR1910 regulations, including:               <ul style="list-style-type: none"> <li>• Swing Stage Safety</li> <li>• Scaffold Erector and Dismantler</li> <li>• Pad and Fabrication Shop Safety</li> </ul> </li> <li>• Identify the Safety Regulations as they apply to safe work practices in both refineries, manufacturing plants and commercial settings with emphasis on the importance of :               <ul style="list-style-type: none"> <li>• Identifying safety hazards (unsafe conditions)</li> <li>• Handling of materials, including hazardous materials such as asbestos or biohazards.</li> <li>• Selecting and using PPE</li> </ul> </li> <li>• Explain the use of Safety Data Sheets (SDS) for following precautions when using chemicals in the insulation trade.</li> <li>• Describe the precautions that must be followed when working in Confined spaces.</li> <li>• Recognize and explain the setup and dismantling of a scaffolding system.</li> <li>• Recognize welder safety and working conditions and apply acceptable safety preventive measures.</li> <li>• Outline emergency procedures and how to obtain assistance for injured workers.</li> <li>• Demonstrate ability to render CPR, CPR with AED, offering First Aid on the job site.</li> <li>• Firestop and Smoke Penetration Technologies.</li> </ul>

Fifth Period	Advanced Metal Jacketing I	
	<i>On-the-Job Learning (OJL)</i>	<i>Related Technical Instruction (RTI)</i>
	<ul style="list-style-type: none"> <li>• Usage , Inspection and maintenance the proper PPE that should be worn during insulation and sheet metal application including, but not limited to:               <ul style="list-style-type: none"> <li>• Head, Face, Eyes, Ears, Hands, Body, Feet &amp; Respiratory</li> <li>• Cut prevention while working with sheet metal.</li> <li>• Care when working with Metal Shears, Breaks, Beaders, Crimpers, Sheet Metal Formers and Rollers.</li> </ul> </li> <li>• Perform a job analysis for safe working conditions, including:               <ul style="list-style-type: none"> <li>• Attend pre-job safety meetings.</li> <li>• Adhere to site specific safety rules and federal regulations.</li> <li>• Read and interpret SDS.</li> <li>• Establish and maintain a safe working perimeter.</li> </ul> </li> <li>• Maintain clean work areas (housekeeping).</li> <li>• Demonstrate proper and safe handling of sheet metal materials.</li> <li>• Demonstrate proper and safe handling of Power tools including:               <ul style="list-style-type: none"> <li>• Drills</li> <li>• Electric Shears</li> <li>• Hydraulic Presses</li> <li>• Hydraulic Breaks</li> </ul> </li> <li>• Identify the locations of First Aid and Fire Equipment.</li> <li>• Demonstrate basic sheet metal lay-outs while constructing necessary patterns.</li> <li>• Recognize dangerous situations that pertain to sheet metal equipment or unsafe work practices.</li> <li>• Follow proper protocol for reporting and correcting the safety issues.</li> </ul>	<ul style="list-style-type: none"> <li>• Recognize the important areas of OSHA in specific terms: working safely with sheet metal and numerous types of fabrication machines.</li> <li>• Understand the necessity for being proficient in Shop Math.               <ul style="list-style-type: none"> <li>• Understand the basics of Line Development.</li> <li>• Demonstrate the ability to work with fractions</li> <li>• Ability to demonstrate abstract visualization.</li> </ul> </li> <li>• Demonstrate mastery of Line Development               <ul style="list-style-type: none"> <li>• Ability to Bi-Sect a straight line.</li> <li>• Ability to further bi-sect this line into smaller sections identified by degrees.</li> <li>• Be able to create Angles of various degrees, such as 90 degrees, 67 ½ Degrees, 45 degrees and 22 ½ degrees.</li> </ul> </li> <li>• Demonstrate the ability to read a ruler or measuring tape.</li> <li>• Demonstrate the ability set-up, calibrate, adjust and use various pieces of sheet metal fabrication equipment.</li> <li>• Describe the precautions that must be followed when working with Sheet metal equipment such as Metal Shears, Breaks and Rollers.</li> <li>• Demonstrate an understanding of OSHA safety requirements pertaining to PPE.</li> </ul>

Sixth Period	Advanced Metal Jacketing II	
	<i>On-the-Job Learning (OJL)</i>	<i>Related Technical Instruction (RTI)</i>
	<ul style="list-style-type: none"> <li>• Usage , Inspection and maintenance the proper PPE that should be worn during insulation and sheet metal application including, but not limited to: <ul style="list-style-type: none"> <li>• Head, Face, Eyes, Ears, Hands, Body, Feet &amp; Respiratory</li> <li>• Cut prevention while working with sheet metal.</li> <li>• Care when working with Metal Shears, Breaks, Beaders , Crimpers, Sheet Metal Formers and Rollers.</li> </ul> </li> <li>• Perform a job analysis for safe working conditions, including: <ul style="list-style-type: none"> <li>• Attend pre-job safety meetings.</li> <li>• Adhere to site specific safety rules and federal regulations.</li> <li>• Read and interpret SDS.</li> <li>• Establish and maintain a safe working perimeter.</li> </ul> </li> <li>• Maintain clean work areas (housekeeping).</li> <li>• Demonstrate proper and safe handling of sheet metal materials and Attachment protocols.</li> <li>• Demonstrate proper and safe handling of Power tools including: <ul style="list-style-type: none"> <li>•Drills</li> <li>•Electric Shears</li> <li>•Hydraulic Presses</li> <li>•Hydraulic Breaks</li> </ul> </li> <li>• Demonstrate proficiency with the use of First Aid and Fire Equipment.</li> <li>• Demonstrate advanced sheet metal lay-outs by constructing necessary patterns.</li> <li>• Recognize dangerous situations that pertain to sheet metal equipment or unsafe work practices.</li> <li>• Follow proper protocol for reporting and correcting the safety issues.</li> </ul>	<ul style="list-style-type: none"> <li>• Recognize the important areas of OSHA in specific terms: working safely with sheet metal and numerous types of fabrication machines.</li> <li>• Understand the necessity for being proficient in Shop Math. <ul style="list-style-type: none"> <li>• Understand Advanced Line Development.</li> <li>• Demonstrate the ability to work with fractions, decimals and metrics.</li> <li>• Ability to demonstrate abstract visualization while fabricating complex forms or shapes.</li> </ul> </li> <li>• Demonstrate mastery of Line Development by fabricating the weatherproof coverings for the following objects: <ul style="list-style-type: none"> <li>• Equal Tee</li> <li>• Unequal Tee</li> <li>• Off-Set Tee</li> <li>• Equal Lateral</li> <li>• Unequal Lateral</li> <li>• Gores for 90 degree fittings</li> <li>• Gores for 45 degree fittings</li> <li>• Stovepipe 90's</li> <li>• Segmented 90's</li> <li>• Head Gores</li> <li>• Cones</li> <li>• Square to Round</li> <li>• Pipe Sweeps of varying Ratios.</li> </ul> </li> <li>• Demonstrate the ability set-up, calibrate, adjust and use various pieces of sheet metal fabrication equipment.</li> <li>• Describe the precautions that must be followed when working with Sheet metal equipment such as Metal Shears, Breaks and Rollers.</li> <li>• Demonstrate an understanding of OSHA safety requirements pertaining to PPE.</li> </ul>

Seventh Period	Introduction to Blueprints, Codes and Specifications	
	<i>On-the-Job Learning (OJL)</i>	<i>Related Technical Instruction (RTI)</i>
	<ul style="list-style-type: none"> <li>• Interpret and apply mechanical drawings and their associated components on the job, including:               <ul style="list-style-type: none"> <li>• Blueprints</li> <li>• Scale rulers</li> <li>• Symbols and terminology</li> <li>• Shop drawings</li> <li>• Materials lists</li> <li>• Optimization schedules</li> <li>• Details</li> <li>• Contract specifications</li> </ul> </li> <li>• Demonstrate the ability to make freehand sketches in a quick and efficient manner without using a compass, straight edge or protractor.</li> <li>• Demonstrate how to make the following sketches:               <ul style="list-style-type: none"> <li>• Oblique drawings of straight and curved objects</li> <li>• Basic isometric and perspective sketches</li> <li>• Measure objects for fabrication</li> <li>• Demonstrate an understanding of spatial relationships.</li> </ul> </li> <li>• Read a shop drawing and relate the information on it to an actual mechanical system.</li> <li>• Interpret detail diagrams of architectural and mechanical drawings to identify the following:               <ul style="list-style-type: none"> <li>• Piping Systems – Steam supply and return; Domestic water – hot and cold.</li> <li>• HVAC Systems – Supply and Return.</li> <li>• Identification Pillars</li> <li>• Pumps</li> <li>• HVAC Fans</li> <li>• Rain water piping</li> <li>• Changes in Elevation</li> </ul> </li> <li>• Make a list of materials based on the shop or field drawing.</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the parts, purpose and importance of using the following on an Insulation job:               <ul style="list-style-type: none"> <li>• Blueprints</li> <li>• Shop drawings</li> <li>• Specifications and schedules</li> <li>• Finish schedules</li> <li>• Contract specifications</li> <li>• Change notices</li> <li>• Site Instructions</li> <li>• Request for Information</li> <li>• Request for Quotation</li> <li>• Request for Proposal</li> </ul> </li> <li>• Read and interpret the details of blueprints, shop drawings.</li> <li>• Describe the differences between an oblique drawing, an isometric drawing, and a perspective drawing.</li> <li>• Identify the various views of a drawing that are included in a set of plans and their relationship to each other.</li> <li>• Identify and define piping symbols, abbreviations, and lines used in drawings.</li> <li>• Identify changes in elevation.</li> <li>• Identify a variety of mechanical systems or pieces of equipment.</li> <li>• Define the meaning of scale.</li> <li>• Use fractional ruler to calculate measurements.</li> <li>• Explain how an architect’s scale is used to measure lines.</li> <li>• Use the architect’s scale to determine the actual length of a scaled line.</li> <li>• Recognize, locate, and determine missing dimensions.</li> <li>• Describe proper handling procedures for plans and drawings.</li> <li>• Identify associated materials on a set of plans such as type of insulation and protective covering.</li> <li>• Determine final measurements, taking into consideration pipe length, number of fittings, tee’s and valves.</li> </ul>

Eight Period	Removable Insulation Design	
	<i>On-the-Job Learning (OJL)</i>	<i>Related Technical Instruction (RTI)</i>
	<ul style="list-style-type: none"> <li>• Interpret and apply mechanical drawings and their associated components on the job, including:               <ul style="list-style-type: none"> <li>• Blueprints</li> <li>• Scale rulers</li> <li>• Symbols and terminology</li> <li>• Shop drawings</li> <li>• Materials lists</li> <li>• Details</li> <li>• Contract specifications</li> </ul> </li> <li>• Demonstrate the ability to make freehand sketches in a quick and efficient manner without using a compass, straight edge, or protractor.</li> <li>• Demonstrate how to make the following sketches:               <ul style="list-style-type: none"> <li>• Oblique drawings of straight and curved objects</li> <li>• Basic isometric and perspective sketches</li> <li>• Measure objects for fabrication accurately</li> <li>• Demonstrate an understanding of spatial relationships.</li> </ul> </li> <li>• Read a shop drawing and relate the information on it to an actual removable pad.</li> <li>• Make a list of materials based on the shop or field drawing.</li> <li>• Demonstrate the use of an electronic I-Pad for taking pictures and measuring for accurate pad fabrication.</li> <li>• Demonstrate the ability to send photographs and measurements to off-site locations.</li> <li>• Ability to type detailed information so it may be accurately communicated to someone else.</li> <li>• Demonstrate ability to set-up and use an Industrial Sewing Machine.</li> <li>• Demonstrate the ability to set-up and operate a Compressor and Air-operated Hog- Ring Gun.</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the parts, purpose and importance of using the following to manufacture removable pads:               <ul style="list-style-type: none"> <li>• Blueprints</li> <li>• Shop drawings</li> <li>• Contract specifications</li> <li>• Change notices</li> <li>• Site Instructions</li> <li>• I-Pad photographs with measurements.</li> </ul> </li> <li>• Read and interpret the details of blueprints, shop drawings.</li> <li>• Identify the various views of a drawing that may accompany a custom fabrication for a specific valve, turbine or application.</li> <li>• How to fabricate a variety of mechanical systems or pieces of equipment.</li> <li>• Demonstrate the ability to accurately measure, to scale, complex objects.</li> <li>• Ability to set-up and properly thread an Industrial Sewing machine.</li> <li>• Ability to successfully operate and industrial sewing machine.</li> <li>• Ability to set-up and operate a Compressor and Air-operated Hog- Ring Gun.</li> <li>• Demonstrate the ability to measure, fabricate and install various configurations of Removable Insulation pads using either an air-actuated Hog-Ring gun; using Quilts and Pins; or an Industrial Sewing machine; using Quilts and Pins; and other attachment hardware.</li> </ul>

Ninth Period	Effective Supervision and Construction Safety	
	<i>On-the-Job Learning (OJL)</i>	<i>Related Technical Instruction (RTI)</i>
	<ul style="list-style-type: none"> <li>• Demonstrate the ability to determine, inspect and maintain the proper PPE for a given job site including, but not limited to:               <ul style="list-style-type: none"> <li>• Head</li> <li>• Face</li> <li>• Eyes</li> <li>• Ears</li> <li>• Hands</li> <li>• Body</li> <li>• Feet</li> <li>• Respiratory</li> </ul> </li> <li>• Perform a job analysis for safe working conditions, including:               <ul style="list-style-type: none"> <li>• Attend pre-job safety meetings.</li> <li>• Adhere to site specific safety rules and federal regulations.</li> <li>• Read and interpret SDS.</li> <li>• Establish and maintain a safe working perimeter.</li> </ul> </li> <li>• Maintain clean work areas (housekeeping).</li> <li>• Demonstrate proper and safe handling of insulation materials.</li> <li>• Identify the locations of First Aid and Fire Equipment.</li> <li>• Demonstrate basic safety awareness practices.</li> <li>• Demonstrate the process by which to erect and dismantle a scaffolding system.</li> <li>• Recognize dangerous situations that pertain to damaged equipment or unsafe work practices and follow proper protocol for reporting and correcting the situation.</li> <li>• Provide competent supervision for a work crew.</li> <li>• Demonstrate leadership qualities.</li> <li>• Demonstrate the ability to form a cohesive work group.</li> <li>• Demonstrate an ability to develop management skills required by Forepersons in the industry.</li> </ul>	<ul style="list-style-type: none"> <li>• Recognize the important areas of OSHA in specific terms: Ladder safety, high reaches and Confined spaces, etc.</li> <li>• Successfully complete an OSHA 30 safety course.</li> <li>• Successfully complete a course on Disaster Response.</li> <li>• Successfully complete certification in CPR and First Aid.</li> <li>• Demonstrate ability to render CPR, CPR with AED, offering First Aid on the job site.</li> <li>• Demonstrate the ability to research job situations in both the OSHA 29CFR1926 and 29CFR1910 regulations, including:               <ul style="list-style-type: none"> <li>• Focus Four</li> <li>• Fall Protection</li> <li>• Scaffold Safety</li> </ul> </li> <li>• Identify the Safety Regulations as they apply to safe work practices in both refineries, manufacturing plants and commercial settings with emphasis on the importance of :               <ul style="list-style-type: none"> <li>• Identifying unsafe conditions</li> <li>• Handling of materials, including hazardous materials such as asbestos or biohazards.</li> <li>• Selecting and using PPE</li> </ul> </li> <li>• Demonstrate and understanding of Supervision and Leadership, to include:               <ul style="list-style-type: none"> <li>• Types of Leadership</li> <li>• Types of Individual Personality</li> <li>• The importance of successful communication both with the workers, upper management and other trades.</li> <li>• Team building.</li> <li>• Management skills</li> <li>• Attention to details and paperwork.</li> <li>• Responsibilities of a leader.</li> <li>• Mentoring.</li> </ul> </li> <li>• Demonstrate the skills and responsibilities of a successful Job Steward.</li> <li>• Facilitate a “Tool Box” Safety Meeting.</li> </ul>

Tenth Period	Remedial Curriculum Review	
	<i>On-the-Job Learning (OJL)</i>	<i>Related Technical Instruction (RTI)</i>
	<ul style="list-style-type: none"> <li>• Attend union functions to understand how structure and certain activities take place (example: political action events, union meetings, etc.)</li> <li>• Work in compliance with all labor laws</li> <li>• Demonstrate the characteristics of a craft professional.</li> <li>• Participate in union-related activities.</li> <li>• As a leader on the jobsite recognize symptoms of drug or alcohol abuse in Co-workers</li> <li>• Use the same ability to identify drug and alcohol symptoms to assure worker safety on the jobsite</li> <li>• Demonstrate the ability to properly direct, a Co-worker, to drug or alcohol abuse counseling for assistance.</li> <li>• Become familiar with and follow the rules and regulations of any drug and alcohol policies in the Master CBA or an employer’s program.</li> <li>• Understand the importance of Team Building and creating a learning community</li> <li>• Describe the Team Performance Model and it's components</li> <li>• Identify a stage of team performance model where there is an unresolved issue</li> <li>• Use the team performance model to resolve any issues</li> <li>• Identify group stages (forming, storming, norming, and performing)</li> <li>• Demonstrate the ability to form highly productive and motivated teams on the jobsite.</li> <li>• Identify the reasons why teams, on a jobsite, are failing; by using the team model performance.</li> <li>• Use the Team performance model to resolve any jobsite issues.</li> </ul>	<ul style="list-style-type: none"> <li>• This period is designed to provide the apprentice with an opportunity to develop skills necessary to reach Journey person status. Skills which the apprentice has demonstrated they have not yet acquired.</li> <li>• Participate in the construction and implementation of an individual course of empirical remedial instruction.</li> <li>• Begin this course work in areas where the apprentice has previously demonstrated success. This aids in building confidence.</li> <li>• Continued instruction should progress from the simple to the more difficult. Each task providing the apprentice projects where they have previously demonstrated deficiencies.</li> <li>• Individual One-On-One instruction may be necessary.</li> <li>• The apprentice may require constant reinforcement accompanied by repetitive tasks to reinforce “new” skills.</li> </ul>

