



APPRENTICESHIP STANDARDS

DEVELOPED BY

FOR THE OCCUPATION OF

Pipefitter II (PFJ Limited License) SOC: 47-2152.01 RAPIDS CODE: 90087

APPROVED AND CERTIFIED BY THE

The Rhode Island Department of Labor & Training
APPRENTICESHIP OFFICE

Sherri Scalzo, SUPERVISOR OF APPRENTICESHIP

REGISTERED AS PART OF THE NATIONAL APPRENTICESHIP PROGRAM
IN ACCORDANCE WITH THE BASIC STANDARDS OF APPRENTICESHIP
ESTABLISHED BY THE SECRETARY OF LABOR



Apprenticeship

REGISTRATION DATE:

DATE OF MOST RECENT UPDATE:

RAPIDS REGISTRATION NUMBER:

The legal requirements for registered apprenticeship are contained in 29 USC 50 and 29 CFR § 29 and 30 and Rhode Island General Laws Chapter 28 Section 45. RI DLT requires that standards be typed.



Appendix A

TERM OF APPRENTICESHIP, ON THE JOB LEARNING OUTCOMES, & RELATED INSTRUCTION OUTLINE

Pipefitter II (PFJ Limited License) SOC: 47-2152.01 RAPIDS CODE: 90087

This schedule is attached to and a part of these Standards for the above identified occupation.

1. TERM OF APPRENTICESHIP. The term of the occupation is Time Based, 4000 hours of on-the-job learning (OJL), supplemented by 288 hours (2 levels) of related instruction. The probationary period shall be defined as _____ hours on the job. To become a licensed Pipefitter II, apprentices are required to pass the license exam. Credit for prior learning (work hours or instruction) granted by the sponsor requires the approval of the Mechanical Board to be applicable toward eligibility to test for the license.

Apprentices will will not be paid for hours spent attending classes.

Classes will be offered during, not during regular work hours or a combination.

If the apprentice is responsible for paying for any portion of the related instruction, indicate the amount or percent. _____

2. MENTOR RATIO. The ratio is 1 Apprentice to 1 Journeyworker. Ratios apply to the job site.

3. APPRENTICE WAGE SCHEDULE. Apprentices shall be paid a progressively increasing schedule of wages based on _____ percentages or _____ dollar amounts progressing to the journeyworker wage rate: \$____.

<i>Period</i>	<i>Wage \$ or %</i>		<i>OJL Hours</i>	<i>Other milestones for wage progression</i>
1st			1000	
2nd			1000	Level 1 instruction
3rd			1000	
4th			1000	Level 2 instruction
End Wage		100%	XXXX	Eligible to test for PIPEFITTER II (PFJ Limited License).

4. SCHOOL(S) APPRENTICES WILL ATTEND. The table below lists education providers.

	<i>Pipefitter II</i>
MTTI	
NEIT (New England Institute of Technology)	
NETTTS (New England Tractor Trailer Training School)	
RICTA (ABC Rhode Island Construction Training Academy)	
RIPHCCA (Rhode Island Plumbing Heating Cooling Contractors Association)	
UA Local Union 51	
Other	

*If your apprentices are receiving instruction out-of-state, it is the Sponsor's responsibility to provide a review of any code amendments adopted by the State of Rhode Island.

5. APPRENTICE MINIMUM ENTRY QUALIFICATIONS

The Sponsor establishes the following minimum qualifications for entry:

Age. Apprentices must be 18 years old to register in the licensed mechanical trades.

Education. *Please specify any education requirements.*

Apprentices must have a high school diploma or equivalency or be enrolled in an education program which leads to obtaining a high school diploma or equivalency certification and be able to provide a transcript showing courses taken, grades, and record of attendance.

Apprentices must pass a math assessment to demonstrate readiness for coursework.

Other education requirements (please be specific).

Physical. Applicants will be physically capable of performing the essential functions of the apprenticeship program, with or without a reasonable accommodation, and without posing a direct threat to the health and safety of the individual or others. *Please specify any additional physical requirements, for example a physical agility test, fitness test, or other screen prior to being employed.*

Other. *If the occupational license or your company human resources policy has other entry requirements or tests, please specify requirements here or attach a copy of the relevant policy.*

6. APPLICATION and SELECTION PROCEDURES

Sponsors have the flexibility to design application and selection procedures following the guidelines in 41 CFR part 60-3. The procedures outlined below are provided as an example. Participating employers must attach their application and selection procedures if not following the procedures below.

Sponsor will follow procedures below Selection procedures are attached

1. Information about the program including the EO pledge and how to apply will be made available in accordance with the requirement for universal outreach.
2. Applications from external candidates will be accepted according to deadlines and requirements that are publically posted with the job announcement and/or on the application packet. Every person requesting an application will have one made available.
3. Before completing the application, each applicant will be provided information about the program included the specifics of the Apprenticeship Agreement.
4. All applications for this occupation will be identical in form and requirements. Progress by dates and final disposition of each application will be documented.
5. Receipt of the properly completed application along with required supporting documents will constitute receipt of a completed application.
6. Applications will be screened for the minimum qualifications and completeness. Applicants deficient in one or more qualifications or requirements or making false statements on their applications will be

notified in writing of their disqualification and of the appeal rights available to them. No further processing of such applications will be taken.

7. Complete applications meeting the minimum requirements will be ranked based on the factors in the posted job description.
8. The top ranking applicants will be invited to interview.
9. Participating employers will conduct apprentice applicant interviews using consistent job-related questions and maintain records of each interview summarizing responses and reason for acceptance or lack of acceptance.
10. Participating employers will rate and select applicants. Scoring records will be maintained.

ON THE JOB TRAINING OUTLINE

Pipefitter II (PFJ Limited License) SOC: 47-2152.01 RAPIDS CODE: 90087

SCHEDULE OF WORK EXPERIENCE

Pipefitters lay out, assemble, install, or maintain pipe systems, pipe supports, or related hydraulic or pneumatic equipment for steam, hot water, heating, cooling, lubricating, sprinkling, or industrial production or processing systems. This outline meets the requirements for preparing for the Pipefitter II (limited license) in Rhode Island (RIGL 28-27), which covers work with commercial and residential heating installations up to 500,000 BTUs.

Apprentices will receive training in the various work experiences listed below. The order in which this training is given will be determined by the flow of work on the job and will not necessarily be in the order listed. The times allotted to these various processes are the estimated times which the average apprentice will require to learn each phase of the trade. They are intended only as a guide to indicate the quality of the training being provided and the ability of the apprentice to absorb this training in an average amount of time.

Work Activity and Hours – On the Job Training	Limited License (Pipefitter II)
A. TOOLS & EQUIPMENT Learning the names and uses of all tools and equipment used by the pipefitter in the trade, such as die stocks, pipe cutters, pipe machines, wrenches (all sizes, chain falls, welding equipment (arc and oxyacetylene, scaffolding, rigging and all types of power equipment).	200
B. STEAM HEATING. Connecting of all vacuum pump systems, installation of one pipe systems, installation of two pipe return systems, installation of two pipe gravity systems, installation of controls	650
C. HOT WATER HEATING Installation of open tank systems, installation of pressure tank systems, installation of hot water systems with pump, installation of snow melting systems, installation of panel heating systems, installation of thermostatic controls, installation of split loop, reverse return, convectors, hot water unit heaters, baseboard, circulators, zone valves, expansion tanks, air eliminators	950
D STEAM GENERATING & AUXILIARY EQUIPMENT Connecting superheater, blow-off tanks, superheater Condensate traps Condensate return pumps Injectors, boiler feed pumps F.W. Regulators Condensers and heaters Receivers Steam to process work Reducing pressure valves Blow-off tanks, superheater Instrument & Controls Pipe Fabrication	850
E. WELDING, BRAZING & SOLDERING 700 <ul style="list-style-type: none"> • Pipe cutting by torch. Use of acetylene torch, use of various types of nozzles • Use of all welding equipment, pipe welding (arc, oxyacetylene & inert gas) 	400

Work Activity and Hours – On the Job Training	Limited License (Pipefitter II)
<ul style="list-style-type: none"> • Pipe cutting by torch, pre-heating and stress relieving • Brazing and soldering technique, use of silver solder on piping • Safety 	
F. PNEUMATIC TUBE WORK <ul style="list-style-type: none"> • Carrier Systems • Clamping • Jointing 	50
G. INSTALLATION <ul style="list-style-type: none"> • Cooking utensils, steam tables, laundry equipment, hospital sterilizers, and other equipment which requires steam connections. • Connecting piping, gate valves, check valves, fittings, traps and other fittings necessary for the proper installation of the above named equipment. • 	250
H. OIL BURNER WORK (Residential) <ul style="list-style-type: none"> • Tank location • Vent pipe for tank • Fill pipe for tank • Use of proper Joint compound • Proper care of threads • Testing pipe for air pressure • Copper tubing with connections from tank to burner. • Safety fusible connections • Requirements for certificate of competency. 	400
I. OIL BURNER WORK (Industrial) <ul style="list-style-type: none"> • Installation of burner, storage tanks, heating coils, vent & fill pipes, automatic controls 	250
J. OIL & GASOLINE PIPING (Garages, refineries, oil farms) <ul style="list-style-type: none"> • Piping, valves pumps • Flow meters • Foamite systems • Process piping for refinery equipment 	
TOTAL	4000

RELATED INSTRUCTION OUTLINE

Pipefitter II (PFJ Limited License) SOC: 47-2152.01 RAPIDS CODE: 90087

Method of delivery: Courses are delivered through classroom instruction with a hands-on learning lab. Sponsors are invited to use any training provider with the ability to provide the required education under the direction of qualified instructors. The training provider must be specified in these Standards.

Concurrent High School Apprenticeship Option: High school students, age 18 or older who are enrolled in a mechanical trade program may register in this apprenticeship program with their enrollment in high school mechanical trade courses fulfilling the obligation to be enrolled in related instruction while they are a high school student. Upon graduation from high school the student will be assessed for placement into the proper level in the Apprenticeship Instruction sequence and will complete the remaining levels with the instruction provider selected by the sponsor.

LEVEL 1 - Minimum 144 hours

Introduction to the Pipefitting Profession:

- Responsibilities and characteristics of successful pipefitters
- Range of careers: residential, commercial, and industrial service & installation
- Pipefitter I & II state trade licensing in Rhode Island
- Apprentice roles and responsibilities
- OSHA Guidelines, safety on the job site, basic rigging, ladders and scaffolds
- Importance of workplace communication

Fundamentals:

- One and two pipe steam system, High pressure steam basics, What are hydronic heating systems?
- Benefits of hydronic heating, Basics of hydronic subsystems, The importance of system design

Properties of Water:

- Sensible heat versus latent heat, Specific heat and heat capacity, Sensible heat quantity equation & sensible heat rate equation, Vapor pressure and boiling point
- Density, viscosity, dissolved air in water & incompressibility

Fluid Flow in Piping:

- Basic concepts of fluid mechanics: what is a fluid?
- Analyzing fluid flow in smooth pipes, hydraulic resistance of fittings, valves, and other devices
- The system head loss curve, piping components represented as series resistors
- Parallel hydraulic resistances, reducing complex piping systems
- Software-based circuit analysis, pipe sizing considerations

Piping, Fittings, and Valves:

- piping materials: common piping, fittings, specialized fittings for hydronic systems, thermal expansion of piping, common valves, specialty valves for hydronic applications schematic symbols for piping components, sizing & installation of natural gas, propane and oil piping systems

Heat Sources:

Classification of hydronic heat sources: gas- and oil-fired boiler designs, electric boilers, ETS systems, solid-fuel boilers, domestic hot water tanks as hydronic heat sources, multiple boiler systems, boiler heating capacity, power venting exhaust systems, combustion air requirements, Hydronic heat pumps & system design considerations, renewable energy heat sources

Heat Emitters:

Classification of heat emitters: finned-tube baseboard convectors, thermal ratings and performance of finned-tube baseboard, sizing finned-tube baseboard, hydronic fan-coils, thermal performance of fan-coils. other hydronic heat emitters: panel radiators, head loss of heat emitters, heat loss from copper tubing, thermal equilibrium

Hydronic Circulators:

Circulators for hydronic system; Placement of the circulator within the system, Circulator performance, smart circulators, analytical methods for circulator performance, Circulator efficiency, special purpose circulators, selecting a circulator, cavitation, operating cost

Code Basics:

RI Building Code, RI approved editions of International Mechanical Code and Fuel Gas Code Permits, approvals, and inspections

LEVEL 2- MINIMUM 144 HOURS**Distribution Piping Systems:**

Zoning considerations, system equilibrium:

The concept of iterative design, single series circuits, single circuit/multizone (one-pipe) systems, multi-circulator systems and hydraulic separation, multizone systems using circulators, multizone systems using zone valves, parallel direct-return systems, parallel reverse-return systems, home run distribution systems, primary/secondary systems, distribution efficiency, hybrid distribution systems

Expansion Tanks:

Standard expansion tanks, diaphragm-type expansion tanks estimating system volume, the expansion tank sizer software module, point of no pressure change

Air Removal. Filling and Purging:

Problems created by entrapped air, types of entrapped air, air removal devices, correcting chronic air problems, filling and purging a system, make-up water systems

Control Strategies. Components and Systems:

Closed-loop control system fundamentals: controlling the output of heat sources, controlling heat output from heat emitters: outdoor reset control, switches, relays, and ladder diagrams: control system design principles, basic hydronic system control hardware, basic boiler control hardware, mixing strategies and hardware, communicating control systems

Hydronic Radiant Panel Heating:

Hydronic radiant panel heating: what is radiant heating, what is a hydronic radiant panel? History of radiant panel heating, benefits of radiant panel heating, physiology of radiant panel heating. Methods of hydronic radiant panel heating: slab-on-grade radiant floors, concrete thin-slab radiant floors, poured gypsum thin-slab radiant floors, above-floor tube and plate systems, Below-floor tube and plate systems, suspended tube systems, plate-less staple-up systems, Prefab subfloor/underlayment panels, radiant wall panels, radiant ceiling panels, tube placement considerations (floor panels), radiant panel circuit sizing procedure, system piping and temperature control options

Heating Load Estimating:

Definition of design load, conduction heat losses, foundation heat loss, infiltration, computer-aided heat loss calculations, estimating annual heat energy usage

Auxiliary Loads and Specialized:

Heat exchangers: domestic water heating, intermittent garage heating, pool (and spa) heating, hydronic snow melting, buffer tanks, mini-tube distribution systems, BTU metering, introduction to balancing



Apprenticeship Agreement

Rhode Island Department of Labor and Training



The program sponsor and apprentice agree to the terms of the Apprenticeship Standards incorporated as part of this Agreement. The sponsor will not discriminate in the selection and training of the apprentice in accordance with the Equal Opportunity Standards in Title 29 CFR Part 30. This agreement may be terminated by either of the parties, citing cause(s), with notification to the registration agency, in compliance with Title 29, CFR, Part 29.

PART A: TO BE COMPLETED BY APPRENTICE. NOTE TO SPONSOR: PART A SHOULD ONLY BE FILLED OUT BY APPRENTICE.

1 Name (Last, First, Middle) Address (No., Street, City, State, Zip Code) Email Telephone Number *Social Security Number	Answer Both A and B (Voluntary) 4. a. Ethnic Group (Mark one) <input type="checkbox"/> Hispanic or Latino <input type="checkbox"/> Not Hispanic or Latino b. Race (Mark one or more) <input type="checkbox"/> American Indian or Alaska native <input type="checkbox"/> Asian <input type="checkbox"/> Black or African American <input type="checkbox"/> Native Hawaiian or other Pacific Islander <input type="checkbox"/> White	5. Veteran Status <input type="checkbox"/> Non-Veteran <input type="checkbox"/> Veteran 6. Education Level (Mark one) <input type="checkbox"/> 8th grade or less <input type="checkbox"/> 9th to 12th grade <input type="checkbox"/> High School Equivalency (GED) <input type="checkbox"/> High School Graduate <input type="checkbox"/> Post-Secondary or Technical Training
2. Date of Birth (Mo., Day, Yr.) 3. Sex (Mark one) <input type="checkbox"/> Male <input type="checkbox"/> Female		
7a. Employment Status (Mark one) <input type="checkbox"/> New Employee <input type="checkbox"/> Existing Employee 7b. Career Connection (Mark one) (Instructions on reverse) <input type="checkbox"/> None <input type="checkbox"/> Pre-Apprenticeship <input type="checkbox"/> Technical Training School <input type="checkbox"/> Military Veterans <input type="checkbox"/> Job Corps <input type="checkbox"/> YouthBuild <input type="checkbox"/> HUD/STEP-UP <input type="checkbox"/> netWORKri Referral <input type="checkbox"/> School-to-Registered Apprenticeship		
8. Signature of Apprentice _____ Date _____		9. Signature of Parent/Guardian (if minor) _____ Date _____

PART B: SPONSOR: EXCEPT FOR ITEMS 6, 7, 8, 10a. - 10c, REMAINDER OF ITEMS REPOPULATED FROM PROGRAM REGISTRATION.

1. Sponsor Program No. Sponsor Name, Address, Email	2a Occupation <p style="text-align: center; font-size: 1.2em;">Pipefitter II</p>	2b Occupation Code: <p style="text-align: center;">90087</p> 2b.1. Interim Credentials <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																						
3. Training Approach <p style="text-align: center;">Time-Based</p>		4. Term <p style="text-align: center;">4000 hours</p>																						
5. Probationary Period <p style="text-align: center;">hours</p>																								
6a. Credit for Previous Education (RTI Hours) Retain transcripts in the apprentice's file.	6b. Credit for Previous Experience OJL Hours	7. Term Remaining (Hrs.)																						
8. Date Apprenticeship Begins																								
9a. Related Instruction: 288 hours (144 h per year)	9b. Apprentice Wages for Related Instruction <input type="checkbox"/> Will Be Paid <input type="checkbox"/> Will Not Be Paid	9c. Related Training Instruction Source																						
10. Wages: 10a. Pre-Apprenticeship Hourly Wage \$ _____ 10b. Apprentice's Entry Hourly Wage \$ _____ 10c. Journeyworker's Hourly Wage \$ _____																								
Check Box 10d. Term <input type="checkbox"/> Hrs.	<table border="1" style="width: 100%; text-align: center;"> <tr> <th>Period</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> <th>10</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>		Period	1	2	3	4	5	6	7	8	9	10											
Period	1	2	3	4	5	6	7	8	9	10														
10e. Wage Rate (Mark one) % <input type="checkbox"/> or \$ <input type="checkbox"/>																								
11. Signature of Sponsor's Representative(s) _____ Date Signed _____		13. Name and Contact Information for Sponsor Designee to Receive Complaints																						
12. Signature of Sponsor's Representative(s) _____ Date Signed _____																								

PART C: TO BE COMPLETED BY REGISTRATION AGENCY

1. Rhode Island DLT, Apprenticeship Office 1511 Pontiac Ave. Bldg. 70, PO Box 20247, Cranston, RI 02920	2. Signature (Registration Agency) _____	3. Date Registered _____
4. Apprentice ID Number (assigned by RAPIDS) _____		5. Processed by (Staff Initials) _____