



ONTARIO COLLEGE OF TRADES

ORDRE DES MÉTIERS DE L'ONTARIO

Apprenticeship Training Standard

Steamfitter

Trade Code: 307A

Development Date: August 1999

CONTENTS

Page

Preface..... 1

Important Directions for Trainers..... 1

Important Directions to the Apprentice..... 2

Notice/Declaration for Collection of Personal Information 3

Apprentice/Trainee Record4

Employer Information.....5

Apprentice/Trainee Completion form7

Training Unit Completion Form8

TRAINING UNITS

NUMBER

TITLE

U5470.0 Protect Self and Others 9-12

U5471.0 Communicate 13-15

U5472.0 Read, Interpret, and Maintain Drawings and Specifications 16-18

U5473.0 Analyse and Design the System 19-22

U5474.0 Plan and Prepare for the Project. 23-25

U5475.0 Layout and Install Pipe, Fittings, Valves and Supports 26-31

U5476.0 Assemble and Install Process Piping Systems 32-34

U5477.0 Install and Maintain Instrumentation Control Systems 35-37

U5478.0 Install Equipment 38-41

TRAINING UNITS – Cont’d

NUMBER	TITLE	
U5479.0	Install Devices	42-44
U5480.0	Test Systems	45-48
U5481.0	Commission/Activate Systems	49-51
U5482.0	Perform Rigging and Hoisting	52-56
U5483.0	Perform Preventive Maintenance	57-60
U5484.0	Troubleshoot and Repair Mechanical Systems	61-64

Competency Analysis Profile

PREFACE

This training document was developed by the Ministry of Education and Training (MET) in consultation with representatives from the industry. These Training Standards are intended to be used by apprentice/trainee, instructors and companies as a "blueprint" for training or as a prerequisite for Ministry accreditation/certification.

The care and maintenance of this book are the joint responsibility of the apprentice/trainee and the employer. By signing off the skill the trainer and apprentice are indicating that the apprentice has demonstrated successful acquisition of that skill at that date. The trainer may not be held responsible if, at a future date, the apprentice does not successfully repeat the acquired skill. Training Standards were developed specifically for documenting the apprentice's/ trainee's acquisition of skills of the trade.

The book becomes the only record of an apprentice's/trainee's training.

IMPORTANT DIRECTIONS TO TRAINERS

The Training Standards identify skills required for this occupation and its related training program.

These Training Standards have been written in concise statements which describe how well an apprentice/trainee must perform each skill in order to become competent.

In using these Training Standards, trainers will be able to ensure that the apprentice/trainee is developing skills detailed for the occupation.

Trainers and apprentices/trainees are required to sign off and date the skills following each successful acquisition.

Employers participating in this training program will be designated as the Signing Authority and are required to attest to successful achievement by signing on the appropriate line included at the end of each unit.

IMPORTANT DIRECTIONS TO THE APPRENTICE/TRAINEE

Apprentice

1. All hours working for each employer(s) should be recorded in the Employer Information section.
2. The "Summary of Hours" should be completed, signed and dated by both the apprentice and employer when either all terms of the contract have been completed or the apprentice leaves the employ of the employer.
3. It is the responsibility of the apprentice to inform the local Apprenticeship Client Services office regarding the following changes:
 - change of employer address;
 - change of apprentice name or address;
 - transfer to a new employer.
4. At the fulfillment of all terms of a Contract of Apprenticeship, the Apprentice/Trainee Completion Form must be completed and signed by the current employer. Present these completed and authorized Training Standards and the Apprentice/Trainee Completion Form to your local Apprenticeship Client Services office.

NOTICE OF COLLECTION OF PERSONAL INFORMATION

1. At any time during your apprenticeship training, you may be required to show this training standard to the Ministry of Training, Colleges and Universities (the Ministry). You will be required to disclose the signed Apprenticeship Completion form to the Ministry in order to complete your program. The Ministry will use your personal information to administer and finance Ontario's apprenticeship training system, including confirming your completion and issuing your certificate of apprenticeship.
2. The Ministry will disclose information about your program completion and your certificate of apprenticeship to the Ontario College of Trades, as it is necessary for the College to carry out its responsibilities.
3. Your personal information is collected, used and disclosed by the Ministry under the authority of the Ontario College of Trades and Apprenticeship Act, 2009.
4. Questions about the collection, use and disclosure of your personal information by the Ministry may be addressed to the:

Manager, Employment Ontario Contact Centre
Ministry of Training, Colleges and Universities
33 Bloor St. E, 2nd floor, Toronto, Ontario M7A 2S3
Toll-free: 1-800-387-5656; Toronto: 416-326-5656
TTY: 1-866-533-6339 or 416-325-4084.

Please Note: Apprenticeship Training and Curriculum Standards were developed by the Ministry of Training, Colleges and Universities (MTCU). As of April 8th, 2013, the Ontario College of Trades (College) has become responsible for the development and maintenance of these standards. The College is carrying over existing standards without any changes.

However, because the Apprenticeship Training and Curriculum Standards documents were developed under either the Trades Qualification and Apprenticeship Act (TQAA) or the Apprenticeship and Certification Act, 1998 (ACA), the definitions contained in these documents may no longer be accurate and may not be reflective of the Ontario College of Trades and Apprenticeship Act, 2009 (OCTAA) as the new trades legislation in the province. The College will update these definitions in the future.

Meanwhile, please refer to the College's website (<http://www.collegeoftrades.ca>) for the most accurate and up-to-date information about the College. For information on OCTAA and its regulations, please visit: <http://www.collegeoftrades.ca/about/legislation-and-regulations>

APPRENTICE/TRAINEE RECORD

Apprentice/Trainee Name: _____

Contract Number: _____
(If applicable)

EMPLOYER INFORMATION

Company: _____

Address: _____

Telephone: _____

Summary of Hours:

Dates of Employment: _____
From To

Total hours of training and instruction between dates of employment _____ Hours

Employer's
Signature

Date

Apprentice/Trainee
Signature

Date

EMPLOYER INFORMATION

Company: _____

Address: _____

Telephone: _____

Summary of Hours:

Dates of Employment: _____
From To

Total hours of training and instruction between dates of employment _____ Hours

Employer's Date Apprentice/Trainee Date
Signature Signature

EMPLOYER INFORMATION

Company: _____

Address: _____

Telephone: _____

Summary of Hours:

Dates of Employment: _____
From To

Total hours of training and instruction between dates of employment _____ Hours

Employer's Date Apprentice/Trainee Date
Signature Signature

EMPLOYER INFORMATION

Company: _____

Address: _____

Telephone: _____

Summary of Hours:

Dates of Employment: _____
From To

Total hours of training and instruction between dates of employment _____ Hours

Employer's Date Apprentice/Trainee Date
Signature Signature

EMPLOYER INFORMATION

Company: _____

Address: _____

Telephone: _____

Summary of Hours:

Dates of Employment: _____
From To

Total hours of training and instruction between dates of employment _____ Hours

Employer's Date Apprentice/Trainee Date
Signature Signature

APPRENTICE/TRAINEE COMPLETION FORM

Apprentice/Trainee Name _____
 Print

 Signature

Social Insurance Number _____

Training Units when completed should be signed off by Trainer/Signing Authority on the following page and presented with this completion form to your local Apprenticeship Client Services Field Office.

Any supporting documentation should also be attached.

In-School completed: Yes () No () Not Applicable ()
 (proof to be provided)

Hours completed as
 per Contract: Yes () No () Not Applicable ()

Employer Name:

Address: _____

Signing Authority

Signature _____

MTCU USE ONLY:

Recommended for Exam: Yes () No ()

Signature _____ Consultant/Office Code _____

You will be required to disclose this signed form to the Ministry of Training, Colleges and Universities in order to complete your program. The Ministry will use your personal information to administer and finance Ontario's apprenticeship training system.

For further information please see the notice/declaration for collection of personal information that is referenced in the table of contents of this training standard.

TRAINING UNIT COMPLETION FORM

**TRAINING UNIT TITLE
AUTHORITY**

SIGNING

U5470.0	Protect Self and Others	_____
U5471.0	Communicate	_____
U5472.0	Read, Interpret, Create and Maintain Drawings and Specification	_____
U5473.0	Analyse and Design the System	_____
U5474.0	Plan and Prepare for the Project	_____
U5475.0	Layout and Install Pipe, Fittings, Valves and Supports	_____
U5476.0	Assemble and Install Process Piping Systems	_____
U5477.0	Install and Maintain Instrumentation Control Systems	_____
U5478.0	Install Equipment	_____
U5479.0	Install Devices	_____
U5480.0	Test Systems	_____
U5481.0	Commission/Activate System	_____
U5482.0	Perform Rigging and Hoisting	_____
U5483.0	Perform Preventative Maintenance	_____
U5484.0	Troubleshoot and Repair Mechanical Systems	_____

U5470.0 PROTECT SELF AND OTHERS

GENERAL PERFORMANCE OBJECTIVE

Protect self and others by: identifying, interpreting and applying acts, codes, regulations and directives; selecting, wearing, adjusting, using and maintaining personal protective equipment and apparel; recognizing and assessing hazards and hazardous conditions; controlling hazards; assembling, erecting, using and dismantling platforms and scaffolds; performing lock out and tagging procedures; selecting, operating and maintaining tools and equipment; and, performing housekeeping duties.

PERFORMANCE OBJECTIVES

Supervisor's/Trainer's Name (print)

Apprentice's Name (print)

SKILLS

U5470.01 Identify, interpret and apply applicable acts, codes, regulations and directives including WHMIS (Workplace Hazardous Materials Information System), OHSA (Occupational Health and Safety Act), CSAO (Construction Safety Association of Ontario), OBC (Ontario Building Code), WSIB (Workers Safety Insurance Board), EPA (Environmental Protection Act), ASME (American Society of Mechanical Engineers), TSSA (Technical Standards and Safety Authority), DGT A (Dangerous Goods Transportation Act), OFC (Ontario Fire Code), NFPA (National Fire Protection Association), CEC (Canadian Electrical Code), CSA (Canadian Standards Association), ANSI (American National Standards Institute), UL (Underwriters Laboratories), municipal requirements and company policies.

Date Completed

Supervisor's Signature

Apprentice's Signature

U5470.0 PROTECT SELF AND OTHER -Cont'd

U5470.02 Select, wear, adjust, use and maintain personal protective equipment and apparel including safety footwear, hard hats, gloves, glasses, goggles, masks, face shields, coveralls, safety harnesses, respirators, ear protectors/plugs, harnesses, breathing apparatus, ropes, reflector vests, air samplers, gas detectors and radiation badges, so that all equipment and apparel is correctly fitting and used, to ensure the safety of self and others in accordance with company/customer procedures, CSAO and OHSa requirements and manufacturers' instructions.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5470.03 Recognize and assess hazards and hazardous conditions including heights, scaffolds and lifts, work site conditions, welding operations, material handling, transportation and storage, heavy equipment operations, crane operations, hoisting and lifting operations, trenching, audio and visual alarms, ensuring that actions and responses comply with customer/company procedures, OHSa, WHMIS, and applicable codes or regulations.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5470.04 Control hazards by containing, eliminating and reporting hazards, so that appropriate steps are taken to protect self and others in accordance with company/customer policies, OHSa, WHMIS, and applicable codes or regulations.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5470.0 PROTECT SELF AND OTHER -Cont'd

U5470.05 Assemble, erect, use and dismantle platforms and scaffolds including lifting devices, swing stages and bosun's chairs, ensuring that platforms and scaffolds are assembled and dismantled in accordance with engineering drawings, manufacturers' recommendations, company/customer policies and OHSA.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5470.06 Perform lock out and tagging procedures by: advising appropriate authorities; installing lock out devices (retaining key); attaching tags; repairing problem(s) where required; and, removing lock out devices; so that hazardous or defective equipment is isolated and identified in accordance with OHSA, manufacturers' instructions, CEC, and company/customer policies.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5470.07 Select operate and maintain tools and equipment including wrenches, spanners, electric hand tools, torches, pipe cutters, fastening tools, measuring tools, cutting tools, joining tools, leveling tools, grinding tools, drilling tools, rigging tools, A-frame, and fork lift, ensuring that the tools and equipment selected are the correct ones for the application, and no harm or damage is done to either the person or machine, in accordance with manufacturers' recommendations, WHMIS, OHSA, and company/customer policies.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5470.0 PROTECT SELF AND OTHER -Cont'd

U5470.08 Perform housekeeping duties by: removing and disposing of excess or unwanted materials; storing and positioning equipment and materials; identifying the location of first aid equipment and supplies; maintaining heat, light and ventilation; and, erecting protective barriers; to ensure a safe working environment and clean work site, in accordance with company/customer policies, WHMIS, EPA, TSSA, OHSA, and other regulations.

Date Completed

Supervisor's Signature

Apprentice's Signature

Employer's Name

Employer's Signature

U5471.0 COMMUNICATE

GENERAL PERFORMANCE OBJECTIVE

Communicate by: demonstrating effective interpersonal relations; receiving and reacting to instructions; giving instructions to others; reading and interpreting documents and specifications; writing job-related documents; and, practicing personal hygiene.

PERFORMANCE OBJECTIVES

Supervisor's/Trainer's Name (print)

Apprentice's Name (print)

SKILLS

U5471.01 Demonstrate effective interpersonal relations by: listening to customers and co-workers; using verbal and non-verbal signals to convey messages; using language and terminology acceptable in the work place; recognizing the chain of command on a work site; explaining problems and procedures; leaving a copy of the warranty; and, explaining operation, maintenance and warranties to clients; ensuring that human rights and equality are recognized, and that all information communicated is clear, polite and complete, in accordance with company policies and standards.

Date Completed

Supervisor's Signature

Apprentice's Signature

U5471.0 COMMUNICATE -Cont'd

U5471.02 Receive and react to instructions by: assessing the instructions; developing a plan for following the instructions; gathering required materials and tools; and communicating with others; to ensure that the task is completed in a timely and efficient manner, in accordance with company/customer standards, applicable job specifications and codes.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5471.03 Give instructions to others by: clearly identifying steps to be followed; setting out conditions under which instructions are to be completed; and, clearly explaining the task to be carried out, ensuring that the recipient can complete the assigned task in a timely and efficient manner, in accordance with job specifications and codes.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5471.04 Read and interpret documents and/or job specifications including codes, acts, regulations, specifications, work orders, change orders, shop drawings, trade related publications, manufacturers' instructions, and office memos to: identify information needed to complete tasks, gather information, installation specifications, and, pertinent codes and policies; to ensure compliance with job instructions, applicable policies and legislation.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5471.0 COMMUNICATE -Cont'd

U5471.05 Write job-related documents including tool, equipment and material lists, work orders, change orders, office memos, letters, accident reports and forms, so that all job-related information is communicated with co-workers and others clearly, coherently and completely, in accordance with job specifications and company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5471.06 Practice personal hygiene by: identifying appropriate apparel and wearing and maintaining clean clothing, so that personal cleanliness and hygiene standards conform with company standards, clients' requirements, and pertinent safety regulations.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

Employer's Name	Employer's Signature
_____	_____

U5472.0 READ, INTERPRET AND MAINTAIN DRAWINGS AND SPECIFICATIONS

GENERAL PERFORMANCE OBJECTIVE

Read, interpret and maintain drawings and specifications by: identifying required drawings and specifications: identifying and interpreting industry symbols and abbreviations; identifying and selecting drawing equipment; creating drawings and sketches; identifying the drawing approval process; and, maintaining documentation.

PERFORMANCE OBJECTIVES

Supervisor's/Trainer's Name (print)

Apprentice's Name (print)

SKILLS

U5472.01 Identify required drawings and specifications by: reading the drawing title block and/or title page; determining the logical sequence of drawings including site, architectural, mechanical, electrical, structural, schematic and shop drawings; and, verifying that the set is complete and current to contribute to the efficient completion of the project.

Date Completed

Supervisor's Signature

Apprentice's Signature

U5472.02 Identify and interpret industry symbols and abbreviations by reading drawings, charts, guides, schedules and job procedures, to ensure accuracy in interpretation of the drawings and specifications.

Date Completed

Supervisor's Signature

Apprentice's Signature

**U5472.0 READ, INTERPRET AND MAINTAIN DRAWINGS AND SPECIFICATIONS
-Cont'd**

U5472.03 Identify and select drawing equipment including T -squares, triangles, right angles, scale rulers, compasses, computer-assisted drawing (CAD) programs, and output devices, ensuring that the equipment selected are the correct ones to produce drawings and/or sketches to the company/client standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5472.04 Create drawings and sketches including heating plans, flow sheets, elevations, sleeving drawings, schematics, isometric, interference, spool sheets and "as-built drawings," by using required tools and available technology, so that drawings and sketches are accurately completed to facilitate completion of the job, ensuring that each drawing set is completed to specifications and customer/company requirements.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5472.05 Identify the drawing approval process for municipalities, engineers, architects, owners and company/clients by complying with the appropriate standards, regulations and legislation, ensuring that drawings are ready and approval process is followed.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

**U5472.0 READ, INTERPRET AND MAINTAIN DRAWINGS AND SPECIFICATIONS
-Cont'd**

U5472.06 Maintain documentation by: entering changes on "as-built" drawings; revising, modifying and updating drawings; creating a tag system, and a maintenance or equipment directory; and, using tools and technology, ensuring that documents are updated and complete, in accordance with the requirements of approving authorities and company/customer standards. Date Completed Supervisor's Signature Apprentice's Signature

Date Completed Supervisor's Signature Apprentice's Signature

Employer's Name **Employer's Signature**

U5473.0 ANALYZE AND DESIGN THE SYSTEM

GENERAL PERFORMANCE OBJECTIVE

Analyze and design the system by: identifying the type of system to be installed; performing job related calculations; determining system installation requirements; identifying system equipment and devices; selecting the equipment; selecting the devices; laying out and illustrating the piping system; and, submitting design documentation.

PERFORMANCE OBJECTIVES

Supervisor's/Trainer's Name (print)

Apprentice's Name (print)

SKILLS

U5473.01 Identify the type of system to be installed including potable water, fire protection, hydronic heating and cooling, high temperature hot water, vacuum, glycol, low pressure steam, high pressure steam, chilled water, solar system, heat pumps, radiant heat, process steam, hydraulic, pneumatic, refrigerant piping, environmental system, process water, waste disposal, private waste disposal, water treatment, chemical treatment, water purification, gases and combustible fuels, material transport, medical gas system, and clean room environmental system by reading and interpreting drawings and job specifications, ensuring that the system identified conforms with applicable codes, acts, regulations, job specifications, drawings and customer and/or company standards.

Date Completed

Supervisor's Signature

Apprentice's Signature

U5473.0 ANALYZE AND DESIGN THE SYSTEM -Cont'd

U5473.02 Perform job-related calculations including: heat loss/gain calculation; gallons per minute (GPM) calculations; flow rates; and, flow capacities, to determine the types of material and equipment for process systems, steam piping systems, and hydronic heating/cooling systems, ensuring that the installation complies with drawings, specifications, codes, acts and regulations.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5473.03 Determine system installation requirements including size and types of openings, fire stopping, types of materials, size of pipe supports and hangers, size of pipe, type of joining method(s), location of piping, type of equipment, and devices by: reading, interpreting and applying codes, acts, regulations, by-laws, job specifications, drawings and manufacturers' catalogues, to ensure that the installation method selected matches the requirement of the system.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5473.04 Identify system equipment and devices including boilers, condensers, chillers, cooling towers, pumps, blow down tanks, cushion tanks, heat exchangers, converters, baseboards, unit heaters, radiators, convectors and heat transfer units by reading, interpreting and applying codes, acts, regulations, by-laws, job specifications, drawings and manufacturers' catalogues, ensuring that the equipment and devices selected are the correct ones for the system and match the job requirements.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5473.0 ANALYZE AND DESIGN THE SYSTEM -Cont'd

U5473.05 Select the equipment to be installed including boilers, condensers, chillers, cooling towers, pumps, blow down tanks, cushion tanks, heat exchangers, converters, baseboards, unit heaters, radiators, convectors and heat transfer units by reading, interpreting and applying codes, acts, regulations, by-laws, job specifications, drawings and manufacturers' catalogues, ensuring the equipment selected is compatible to the job requirements.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5473.06 Select the devices to be installed including steam traps, pressure reducing valves, pressure and temperature relief valves, backflow prevention devices, safety valves, control valves, metering valves, water meters, balancing valves, tempering valves, aquastats, low water cut-off, and safety, pressure and temperature sensing devices by reading, interpreting and applying codes, acts, regulations, by-laws, job specifications, drawings, and manufacturers' catalogues, ensuring the device selected matches the job requirements.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5473.07 Layout and illustrate the piping system(s) by creating riser diagrams, schematics, flow sheets, spool sheets, isometric drawings and other specifications so that the layout conforms to the requirements of the customer and/or company, codes, acts, regulations, by-laws, specifications and other governing bodies.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5473.0 ANALYZE AND DESIGN THE SYSTEM -Cont'd

U5473.08 Submit design documentation for approval including drawings, sketches, specifications and all related information, ensuring that all designs have been approved and documented prior to proceeding, as specified by governing authorities, engineers and customer or client representative.

Date Completed

Supervisor's Signature

Apprentice's Signature

Employer's Name

Employer's Signature

U5474.0 PLAN AND PREPARE FOR THE PROJECT

GENERAL PERFORMANCE OBJECTIVE

Plan and prepare for the project by: preparing material and labour take-off lists; completing all required applications and documentation; determining required installation equipment and tools; expediting the job; establishing a job schedule; verifying delivered orders; and, storing material, tools and equipment.

PERFORMANCE OBJECTIVES

Supervisor's/Trainer's Name (print)

Apprentice's Name (print)

SKILLS

U5474.01 Prepare material and labour take-off lists by: reading and interpreting project documents; identifying supplies and material(s), labour and equipment requirements; and, determining the availability and delivery dates of supplies and material(s), to ensure that the project complies with drawings and specifications.

Date Completed

Supervisor's Signature

Apprentice's Signature

U5474.02 Complete all required applications and documentation for the installation of high and low pressure piping including steam systems, hydronic heating and cooling, process piping, medical gas, combustible fuels systems, chilled water and condenser piping, fire protection, potable water systems, instrumentation piping and fibre optics, ensuring that applications and documents are prepared in accordance with municipal and provincial requirements.

Date Completed

Supervisor's Signature

Apprentice's Signature

U5474.0 PLAN AND PREPARE FOR THE PROJECT -Cont'd

U5474.03 Determine required installation tools and equipment including elevating devices, hoisting/rigging equipment, power and hand tools, testing, welding and safety equipment, using project documents, so that all materials needed to complete the project are confirmed ready and available to complete the project and ensure an efficient and smooth workflow.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5474.04 Expedite job by: ordering supplies, material, equipment and tools; referencing job specifications, catalogues and approved shop drawings; determining the availability and delivery of material; and, confirming with suppliers, to ensure that material arrives on time to fit with the project schedule.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5474.05 Establish a job schedule by: preparing flow charts; identifying labour requirements; arranging for specialty equipment; coordinating with other trades; and, allowing for adverse weather and working/site conditions, to ensure efficient handling, storage and installation in compliance with the project schedule.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5474.0 PLAN AND PREPARE FOR THE PROJECT -Cont'd

U5474.06 Verify orders by: checking delivered material, equipment and tools; confirming order to purchase; and, contacting supplier(s) as required, to determine that material and equipment match those ordered, in compliance with company policies.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5474.07 Store material, equipment and tools so that they are available for installation by: complying with any special requirements: ensuring that materials and equipment are safe, secure, protected and handled in accordance with manufacturers' recommendations, company and site policies, OHSA and other applicable safety regulations.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

Employer's Name	Employer's Signature
_____	_____

U5475.0 LAYOUT AND INSTALL PIPE, FITTINGS, VALVES AND SUPPORTS

GENERAL PERFORMANCE OBJECTIVE

Layout and install pipe, fittings, valves and supports by: field checking and verifying site drawings; identifying and selecting required piping materials; identifying and selecting various pipe fittings; identifying and selecting various control valves; identifying and selecting various joining methods; identifying and selecting various pipe supports and hangers; creating a series of structural openings; fabricating all required pipe supports, hangers, sleeves, guides and anchors; installing pipe supports, fabricated components and hangers; performing various cutting procedures; joining material; performing tube and pipe bending operations; preparing pipe and fittings; and, installing and joining the pipe and fittings.

PERFORMANCE OBJECTIVES

Supervisor's/Trainers Name (print)

Apprentice's Name (print)

SKILLS

U5475.01 Field check and verify site drawings to enable systems to be fabricated and installed in conformance with applicable codes, acts, regulations, job specifications, drawings, and client and/or company standards. Date Completed Supervisor's Signature
Apprentice's Signature

Date Completed

Supervisor's Signature

Apprentice's Signature

**U5475.0 LAYOUT AND INSTALL PIPE, FITTINGS, VALVES AND SUPPORTS -
Cont'd**

U5475.02 Identify and select required piping materials including cast iron, steel, copper, plastics, stainless steel, glass aluminum, lead and composite materials listed, ensuring that the selected piping materials conform with applicable codes, acts, regulations, job specifications, drawings, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5475.03 Identify and select various pipe fittings including elbows, branched fittings, cross fittings, flanges, couplings, eccentric and concentric reducing couplings, reducing bushings, adapters, expansion joints and fittings, ensuring that pipe fittings selected conform with applicable codes, acts, regulations, job and manufacturer specifications, drawings, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5475.04 Identify and select various control valves including gate, globe, needle, ball, check, multi-port, cage, butterfly, reducing and pressure regulating valves, ensuring that valves selected conform with applicable job specifications, codes, acts, regulations, drawings, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5475.0 LAYOUT AND INSTALL PIPE, FITTINGS, VALVES AND SUPPORTS - Cont'd

U5475.05 Identify and select various joining methods used in the installation of piping systems including caulked, mechanical joints, flanged, threaded, soldered, brazed, welded, bonded, compression, grooved, swaged and flared methods, ensuring that method selected conforms with applicable codes, acts, regulations, job specifications, drawings, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
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_____	_____	_____
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U5475.06 Identify and select various pipe supports and hangers used for the installation of piping systems including clevis, ring, roller, spring and trapeze hangers, pipe and riser clamps, concrete inserts, threaded rod, and strut systems, ensuring that supports and hangers are the correct ones to conform with applicable codes, acts, regulations, job specifications, drawings, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
----------------	------------------------	------------------------

_____	_____	_____
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U5475.07 Create a series of structural openings by: sleeving and drilling to allow for the installation of various piping systems; taking into consideration the installation of fire stopping and pipe insulation; and, monitoring the concrete pour and patch, in conformance with applicable codes, acts, regulations, job specifications, drawings, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
----------------	------------------------	------------------------

_____	_____	_____
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**U5475.0 LAYOUT AND INSTALL PIPE, FITTINGS, VALVES AND SUPPORTS
- Cont'd**

U5475.08 Fabricate all required pipe supports, hangers, sleeves, guides, and anchors by: reading and interpreting job specifications, threading, cutting, bending and welding selected materials, ensuring that fabrication components conform with applicable codes, acts, regulations, job specifications, drawings, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5475.09 Install pipe supports, fabricated components and hangers including clevis, ring and roller, concrete inserts and metal struts by: reading and interpreting job specifications; welding, bolting, threading, cementing/glueing, and, using power actuated inserts, ensuring that the installation conforms with applicable codes, acts, regulations, job specifications, drawings, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5475.10 Perform various cutting procedures including oxy-fuel, plasma-arc and carbon-arc, hack saws, chop saws, portable band saws, grinders, chippers, roll/tube cutters, hammer, chisel, pipe shears, and soil pipe cutters, using drawings and job specifications, ensuring that material is cut to conform with applicable codes, acts, regulations, job specifications, drawings, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

**U5475.0 LAYOUT AND INSTALL PIPE, FITTINGS, VALVES AND SUPPORTS -
Cont'd**

U5475.11 Join material by: reading and interpreting drawings and job specifications; identifying and performing various welding and soldering methods; and, using oxy-fuel, shield metal arc, gas metal arc, tungsten arc hard/soft soldering, and plastic fusion, ensuring that material is joined in conformance with applicable codes, acts, regulations, job specifications, drawings, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
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U5475.12 Perform tube and pipe bending operations by: selecting required tools, materials and equipment including scissors, electric and hydraulic equipment, hand/ratchet benders, and applying heat bending, so that tubes and pipes are bent and prepared, in accordance with manufacturers' instructions, recommendations, applicable codes, acts, regulations, job specifications, drawings, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
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U5475.13 Prepare pipe and fittings, including cast iron, steel, copper, plastics, stainless steel, glass, aluminum and composite materials, by measuring, marking, cutting pipe and fittings and, using appropriate methods, so that pipe and fittings are prepared in conformance with applicable job specifications, manufacturers' recommendations, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
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U5475.0 LAYOUT AND INSTALL PIPE, FITTINGS, VALVES AND SUPPORTS -Cont'd

U5475.14 Install and join pipe and fittings using caulked, mechanical joints, flanged, threaded, soldered, brazed, welded, bonded, compression, grooved, swaged, and flared joining methods, ensuring that pipe and fittings are correctly installed and joined, in conformance with applicable codes, acts, regulations, job specifications, drawings, client and/or company standards.

Date Completed Supervisor's Signature Apprentice's Signature

Employer's Name Employer's Signature

U5476.0 ASSEMBLE AND INSTALL PROCESS PIPING SYSTEMS

GENERAL PERFORMANCE OBJECTIVE

Assemble and install process piping systems by: identifying and selecting the process piping systems to be installed; verifying pipe and fittings characteristics; identifying and verifying the installation location; installing the piping systems; labeling and tagging installed piping systems; and, installing fire stopping measures.

PERFORMANCE OBJECTIVES

Supervisor's/Trainers Name (print)

Apprentice's Name (print)

SKILLS

U5476.01 Identify and select the process piping systems to be installed including potable water, fire protection, hydronic heating and cooling, high temperature hot water, vacuum, glycol, low pressure steam, high pressure steam, chilled water, solar systems, heat pumps, radiant heat, process steam, hydraulics, pneumatics, refrigerant piping, environmental systems, process water, waste disposal, private waste disposal, water treatment, chemical treatment, water purification, gases and combustible fuels, material transport, medical gas systems, and clean room environmental systems by reading and interpreting drawings, schematics and job specifications, ensuring that the system selected for installation conforms with applicable codes, acts, regulations, and client and/or company standards.

Date Completed

Supervisor's Signature

Apprentice's Signature

U5476.0 ASSEMBLE AND INSTALL PROCESS PIPING SYSTEMS -Cont'd

U5476.02 Verify pipe and fittings characteristics by: checking manufacturer, type of material, size, schedule, heat numbers, and joining methods), to ensure that pipe and fittings are in conformance with applicable codes, acts, regulations, job specification and drawings, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5476.03 Identify and verify the installation location of the piping systems by: reading and interpreting drawings, schematics, and job specifications and checking types of systems, ensuring that the equipment selected for the location conforms with applicable codes, acts, regulations, specifications, drawings, client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5476.04 Install piping systems by : reading and interpreting drawings, schematics and job specifications; using applicable tools, equipment and procedures, so that the piping system is correctly installed, in accordance with applicable codes, acts, regulations, job specifications, and client and/or company standards

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5476.0 ASSEMBLE AND INSTALL PROCESS PIPING SYSTEMS -Cont'd

U5476.05 Label and tag installed piping systems by: identifying and verifying system and pipe contents; using colours and lettering designation; indicating flow direction; and, attaching labels, so that the system is identified and labeled in accordance with job specifications, ANSI, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5476.06 Install fire stopping measures by: identifying the sections of the piping systems which require installation; selecting fire stopping devices and material; and, installing fire stopping; ensuring that installation is completed in accordance with manufacturers' recommendations, job specifications, and applicable codes including OFC, OBC. and by-laws.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

Employer's Name	Employer's Signature
_____	_____

U5477.0 INSTALL AND MAINTAIN INSTRUMENTATION CONTROL SYSTEMS

GENERAL PERFORMANCE OBJECTIVE

Install and maintain instrumentation controls systems by: identifying the piping systems; identifying the types and functions of the instruments; determining the system instrumentation requirements; selecting the instrumentation; and, installing, calibrating and maintaining the instrumentation.

PERFORMANCE OBJECTIVES

Supervisor's/Trainers Name (print)

Apprentice's Name (print)

SKILLS

U5477.01 Identify and select the piping systems requiring a control system, including potable water, chilled water, process water, water treatment, water purification, fire protection, hydronic heating and cooling, high temperature hot water, low pressure steam, high pressure steam, radiant heat, process steam, vacuum, glycol, hydraulic, pneumatic, refrigerant piping, waste disposal, private waste disposal, chemical treatment, heat pumps, solar systems, environmental systems, gases and combustible fuels, material transport, medical gas systems, and clean room environmental systems by: reading and interpreting drawings, schematics and job specifications, ensuring the piping system is controlled and operates in accordance with the job specifications and client and/or company standards.

Date Completed

Supervisor's Signature

Apprentice's Signature

**U5477.0 INSTALL AND MAINTAIN INSTRUMENTATION CONTROL SYSTEMS -
Cont'd**

U5477.02 Identify the types and functions of piping system instrumentation controls including flow, temperature, pressure, level, alarm and other parameters by: reading and interpreting manufacturers' instructions and recommendations, specifications and drawings, and, checking that the controls conform to applicable codes, acts, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
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_____	_____	_____
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U5477.03 Determine the control system installation requirements by: identifying flow, temperature, pressure, level, and alarm parameters: identifying electrical requirements; checking for required approvals; and, reading, interpreting and applying codes, acts, regulations, by-laws, job specifications, drawings and manufacturers' catalogues.

Date Completed	Supervisor's Signature	Apprentice's Signature
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_____	_____	_____
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U5477.04 Identify and select the control systems to be installed including programmable logic controllers (PLCs), pneumatic, hydraulic, low voltage, electronic and fibre optic systems by: reading, interpreting and applying codes, acts, regulations, by-laws, job specifications, drawings and manufacturers' catalogues.

Date Completed	Supervisor's Signature	Apprentice's Signature
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_____	_____	_____
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**U5477.0 INSTALL AND MAINTAIN INSTRUMENTATION CONTROL SYSTEMS -
Cont'd**

U5477.05 Install, calibrate and maintain control system(s) by: reading and interpreting instructions contained in manufacturers' instructions and recommendations: and, using appropriate tools and equipment including PLCs, pneumatic, hydraulic, low voltage, electronic and fibre optic systems, verifying that the controls are calibrated, functioning and operational, so that control system(s) are installed in accordance with applicable codes, acts, regulations, job specifications, drawings, manufacturers' directions, and client and/or company standards.

Date Completed

Supervisor's Signature

Apprentice's Signature

Employer's Name

Employer's Signature

U5478.0 INSTALL EQUIPMENT

GENERAL PERFORMANCE OBJECTIVE

Install equipment by: identifying the equipment; verifying the equipment characteristic; selecting the equipment to be installed; assembling the equipment; identifying the installation locations; installing the supports and hangers; and, installing and connecting the equipment to various piping systems.

PERFORMANCE OBJECTIVES

Supervisor's/Trainer's Name (print)

Apprentice's Name (print)

SKILLS

U5478.01 Identify the equipment to be installed including boilers, condensers, chillers, cooling towers, pumps, blow down tanks, cushion tanks, heat exchangers, converters, baseboards, unit heaters, radiators, convectors, other heat transfer units and specialty equipment by: referring to manufacturers' catalogues, job specifications, drawings, acts, codes, regulations, and client and/or company standards. Date Completed
 Supervisor's Signature Apprentice's Signature

Date Completed

Supervisor's Signature

Apprentice's Signature

U5478.0 INSTALL EQUIPMENT -Cont'd

U5478.02 Verify the equipment characteristics by: checking manufacturers, type of material, size, weight, capacity, performance, electrical requirements, approvals, colour, finish, type and location of connections, ensuring that characteristics of equipment conforms to the specific requirements by reference to manufacturers' catalogues, job specifications, drawings, client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5478.03 Select the equipment to be installed by: reading, interpreting and comparing the specifications required to those available for items including size, weight, approved capacity, output and availability, ensuring that equipment selected conforms to job specifications, drawings, acts, codes, regulations, client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5478.04 Assemble the equipment by: reading and interpreting drawings, schematics, manufacturers' instructions and recommendations, and job specifications; using tools and equipment including clamps, bending machine, chisels, drills, flange spreader, grinders, hacksaws, hammers, levels, lifts, pipe cutters, pipe threaders, shear, swaging tool, welding equipment and wrenches, to measure, cut, bend and fasten items, ensuring that assembled equipment conforms with applicable codes, acts, regulations and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5478.0 INSTALL EQUIPMENT -Cont'd

U5478.05 Identify the installation locations of the equipment by: reading and interpreting drawings, schematics and job specifications; checking the equipment will fit the indicated position in accordance with manufacturers' instructions and recommendations, applicable codes, acts, regulations, job specifications, drawings, client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5478.06 Install equipment supports and hangers including house keeping isolating pads, spring hangers, job-built hangers, mounting brackets and supports, flexible connectors and expansion fittings by: reading and interpreting drawings, schematics, specifications and manufacturers' recommendations; using appropriate fastening methods and techniques, and ensuring the installation conforms with applicable codes, acts, regulations, job specification, drawings, client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5478.0 INSTALL EQUIPMENT -Cont'd

U5478.07 Install and connect the equipment to various piping systems by: reading and interpreting drawings, schematics, job specifications and manufacturers' instructions and recommendations; identifying locations of connection points; and, identifying and using appropriate connection methods, so that the equipment is installed in accordance with applicable codes, acts, regulations, specifications, drawings, client and/or company standards.

Date Completed

Supervisor's Signature

Apprentice's Signature

Employer's Name

Employer's Signature

U5479.0 INSTALL DEVICES

GENERAL PERFORMANCE OBJECTIVE

Install devices by: identifying the devices; verifying the device characteristics; selecting the devices; assembling the devices; identifying the installation locations; installing the device supports and hangers; and, installing and connecting the devices to the various equipment and piping systems.

PERFORMANCE OBJECTIVES

Supervisor's Name (print)

Apprentice's Name (print)

SKILLS

U5479.01 Identify the devices including pressure reducing valves, pressure/temperature relief valves, backflow prevention devices, safety valves, control valves, metering valves, balancing valves, tempering valves, water meters, aquastats, thermostats, economisers, circulation pumps, flow switches, PLCs, hi-limit and low-limit controls, low water cut-off, and other safety, temperature and pressure devices by: reading and interpreting drawings, schematics, manufacturers' catalogues and job specifications, ensuring that the devices identified are the correct ones for the system, in conformance with acts, codes, regulations, and client and/or company standards.

Date Completed

Supervisor's Signature

Apprentice's Signature

U5479.0 INSTALL DEVICES -Cont'd

U5479.02 Verify the device characteristics by: checking manufacturer catalogues, type of material, size, weight, capacity, performance, electrical requirements, approvals, colour, finish, and type and location of connections, ensuring that the devices are correct for the system requirements and conform to applicable codes, acts, regulations, specifications, drawings, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5479.03 Select the devices used for the system by: reading and interpreting drawings, manufacturers' recommendations, and job specifications, ensuring that the devices selected are correct for the required application and conform with acts, codes, regulations, job specifications, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5479.04 Assemble the devices by: reading and interpreting drawings, schematics, job specifications, and manufacturers' instructions and recommendations: using applicable tools and equipment to fasten and attach devices, ensuring that assembled devices conform with applicable codes, acts, regulations, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5479.0 INSTALL DEVICES -Cont'd

U5479.05 Identify the installation locations by: reading and interpreting drawings, schematics and job specifications; checking the device will fit the indicated position; and, ensuring the devices conform with applicable codes, acts, regulations, job specifications, drawings, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5479.06 Install device supports and hangers including housekeeping/isolation pads, spring hangers, job-built hangers, mounting brackets and supports, flexible connectors and expansion fittings by: reading and interpreting drawings, schematics, manufacturers' instructions and recommendations; and, using appropriate fastening methods and techniques, ensuring that the installation of the devices conforms with applicable codes, acts, regulations, job specifications, drawings, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5479.07 Install and connect the devices to various equipment and piping systems by: reading and interpreting drawings, schematics, job specifications and manufacturers' instructions and recommendations; identifying locations of connection points; and, identifying and using appropriate collection methods, so that the devices are installed in accordance with applicable codes, acts, regulations, job specifications, drawings, and client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

Employer's Name	Employer's Signature
_____	_____

U5480.0 TEST SYSTEMS

GENERAL PERFORMANCE OBJECTIVE

Test systems by: identifying and selecting the required tests; determining the type, duration, pressures and set-up requirements for the system tests; performing and/or arranging destructive and non-destructive testing on various systems; performing visual inspection; performing stress relieving on trade related materials; arranging for a test or testing schedule; performing piping system testing; performing water treatment testing; and, receiving and documenting test reports and results.

PERFORMANCE OBJECTIVES

Supervisor's Name (print)

Apprentice's Name (print)

SKILLS

U5480.01 Identify and select the required tests for systems including potable water, fire protection, hydronic heating and cooling, high temperature hot water, vacuum, glycol, low pressure steam, high pressure steam, chilled water, solar systems, heat pumps, radiant heat, process steam, hydraulic, pneumatic, refrigerant piping, environmental systems, process water, waste disposal, private waste disposal, water treatment, water purification, gases and combustible fuels, material transport, medical gas systems and clean room environmental systems by: reading and interpreting drawings, schematics and job specifications in accordance with manufacturers' instructions and recommendations, applicable codes, acts, regulations, specifications and drawings, client and/or company standards.

Date Completed

Supervisor's Signature

Apprentice's Signature

U5480.0 TEST SYSTEMS -Cont'd

U5480.02 Determine the type, duration, pressures and set up requirements for system tests including water, air, and inert gases tests by: reading and interpreting drawings, schematics and specifications, ensuring that the tests selected are correct for the system, set up and ready in accordance with manufacturers' instructions and recommendations, applicable codes, acts, regulations, job specifications, drawings, client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5480.03 Perform and/or arrange destructive and non-destructive testing on various systems by methods including: radiography (X-ray), pressure test, purity and graph test, in accordance with manufacturers' instructions and recommendations, applicable codes, acts, regulations, job specifications, drawings, client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5480.04 Perform visual inspection of various piping systems to check for items including completion of joining procedures, leaks, and systems identification markings, ensuring compliance with manufacturers' instructions and recommendations, applicable codes, acts, regulations, job specifications, drawings, client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5480.0 TEST SYSTEMS -Cont'd

U5480.05 Perform stress relieving on trade related materials following methods and procedures and using controlled applications of heat by open flame, ovens and electric resistance, in accordance with manufacturer's instructions and recommendations, applicable codes, acts, regulations, job specifications, drawings, client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5480.06 Arrange for test or a testing schedule for piping systems by: contacting governing authorities; scheduling test; and, checking equipment is ready and prepared for tests, in accordance with manufacturer's instructions and recommendations, applicable codes, acts, regulations, job specifications, drawings, client requirements, and company standards

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5480.07 Perform piping system testing procedures by: testing the systems and replacing any defective components, devices, fixtures or equipment, ensuring that the system is tested and verified to comply with applicable codes, acts, regulations, job specifications and drawings, client requirements and company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5480.0 TEST SYSTEMS -Cont'd

U5480.08 Perform water treatment testing by: drawing the required water samples and applying tests including pH and chemical or mineral analysis, ensuring that the water treatment tests are conducted in a safe and efficient manner to comply with applicable codes, acts, regulations, job specifications, drawings, client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5480.09 Receive and document test reports and results including boiler water analysis, radiography (weld X-ray results), purity tests, and other tests, to verify the testing was successfully completed to comply with applicable codes, acts, regulations, job specifications, drawings, client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

Employer's Name	Employer's Signature
_____	_____

U5481.0 COMMISSION/ACTIVATE SYSTEMS

GENERAL PERFORMANCE OBJECTIVE

Commission or activate systems by: identifying the piping systems that require commissioning and/or activating; determining and performing the required tests for final inspections on completed piping systems; flushing and chemically treating systems; verifying the calibration and operation of equipment and controls; instructing the end users; and, checking the systems are in full operational condition.

PERFORMANCE OBJECTIVES

Supervisor's Name (print)

Apprentice's Name (print)

SKILLS

U5481.01 Identify the piping systems that require commissioning and/or activation including potable water, fire protection, hydronic heating and cooling, high temperature hot water, vacuum, glycol. Low pressure steam, chilled water, solar systems, heat pumps, radiant heat, process steam, hydraulic, pneumatic, refrigerant piping, environmental systems, process water, waste disposal, private waste disposal, water treatment, chemical treatment, water purification, gases and combustible fuels, material transport, medical gas systems and clean room environmental systems in accordance with manufacturers' instructions and recommendations, applicable codes, act5s, regulations, job specifications, drawings, client and/or company standards.

Date Completed

Supervisor's Signature

Apprentice's Signature

U5481.0 COMMISSION/ACTIVATE SYSTEMS -Cont'd

U5481.02 Determine and person the tests required for final inspections on completed piping systems by: installing appropriate test fittings; completing required tests; correcting any deficiencies; removing test apparatus; and, receiving inspection reports, so that tests are completed in accordance with job specifications, applicable codes, municipal by-laws, and company/customer standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5481.03 Flush and chemically treat systems by: selecting appropriate tools and equipment; completing required procedures; and, filling the system with appropriate chemicals or solutions and mediums, so that systems are treated in accordance with applicable codes, acts, regulations, job specifications, drawings, client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5481.04 Verify the calibration and operation of equipment and controls by: selecting appropriate tools and instruments; and, completing required procedures in accordance with manufacturers' instructions and recommendations, applicable codes, acts, regulations, job specifications, drawings, client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5481.0 COMMISSION/ACHVATE SYSTEMS -Cont'd

U5481.05 Instruct end users by: explaining/demonstrating how to use and operate the system; describing maintenance requirements of equipment and devices; and, delivering and presenting on-site equipment documentation, user manuals, operating procedures, manufacturer's instructions, recommendations and warrantees, ensuring that all instructions are clear, concise and accurate, so that the client's or user's questions are answered.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5481.06 Check that the systems are commissioned/activated by ensuring they are operating in accordance with manufacturer's instructions and recommendations, applicable codes, acts, regulations, job specifications, drawings, client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

Employer's Name	Employer's Signature
_____	_____

U5482.0 PERFORM RIGGING AND HOISTING

GENERAL PERFORMANCE OBJECTIVE

Perform rigging and hoisting operations by: reading and interpreting specifications and shop drawings; inspecting the job site; determining the equipment required; scheduling the operation; inspecting the equipment; connecting the equipment to the load; securing the hoisting area; performing the lifting/moving operation; positioning and securing the load in the designated area; disconnecting the load; communicating throughout the operation; removing, checking and storing rigging equipment; and, operating power lifting and hoisting equipment.

PERFORMANCE OBJECTIVES

Supervisor's Name (print)

Apprentice's Name (print)

SKILLS

U5482.01 Read and interpret specifications and shop drawings to determine the weight, size and any special rigging requirements of the material or equipment to be hoisted/moved in compliance with OHSA, Highway Traffic Act, manufacturers' recommendations and client/company procedures. Date Completed Supervisor's Signature Apprentice's Signature

Date Completed

Supervisor's Signature

Apprentice's Signature

U5482.0 PERFORM RIGGING AND HOISTING -Cont'd

U5482.02 Inspect the job site to; ensure safe rigging and hoisting operations may be carried out; identify potential hazards such as proximity to hydro lines; and, check ground conditions for outrigger and accessibility of equipment, in compliance with OHSA, the HEA (Hoisting Engineers Act), and client/company safety procedures.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5482.03 Determine the hoisting/rigging equipment required by; calculating the weights to be lifted; calculating distance and height requirements to the placement area; and, checking site and ground conditions, in compliance with OHSA, HEA and client/company safety procedures.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5482.04 Schedule the hoisting/rigging operation by; consulting the job schedule; checking material delivery schedule and hoisting equipment availability; coordinating the hoisting crew, rigging/hoisting supervisor, client representative and other trades; and, organizing any special requirements such as road closures, in compliance with OHSA, MOT, HEA, power utility companies, and client/company safety procedures.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5482.0 PERFORM RIGGING AND HOISTING -Cont'd

U5482.05 Inspect the rigging and hoisting equipment to ensure that the equipment is in safe working order and has sufficient capacity for the material and equipment to be hoisted, in compliance with ORSA, REA, and client/company safety procedures.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5482.06 Connect the rigging equipment to the load to perform hoisting/moving operations, using shackles, slings, chains, hooks, ropes and other equipment in compliance with ORSA, REA, and client/company safety procedures.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5482.07 Secure the hoisting area by use of barrier tape, barricades or other suitable means to prevent unauthorized personnel from entering the area when rigging and hoisting operations are being performed, in compliance with ORSA, REA, and client/company safety procedures.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5482.0 PERFORM RIGGING AND HOISTING -Cont'd

U5482.08 Perform the lift/move operation, ensuring that pathway is clear of obstacles and unauthorized personnel, in compliance with OHSA, HEA, and client/company safety procedures.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5482.09 Position and secure the load in the designated area so that personnel are not at risk from the load shifting or falling in compliance with OHSA, HEA, and client/company safety procedures.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5482.10 Disconnect the load from the rigging devices including shackles, turnbuckles, hooks and other equipment, in compliance with OHSA, HEA, and client/company safety procedures.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5482.11 Remove and store rigging equipment in a designated area by: checking for worn or frayed items including chain links, wire and ropes; tagging and separating items for repair; and, applying preservation coatings as appropriate, in compliance with OHSA , HEA, and client/company safety procedures.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5482.0 PERFORM RIGGING AND HOISTING -Cont'd

U5482.12 Communicate throughout the hoisting operation using international hand signals or approved voice communication methods in compliance with OHSA, client and company safety procedures.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5482.13 Operate power lifting and hoisting equipment including boom trucks, fork lifts, personnel lifts, scissor lifts, overhead cranes, tuggers and manual lift/moving devices in compliance with OHSA, and client/company safety procedures.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

Employer's Name	Employer's Signature
_____	_____

U5483.0 PERFORM PREVENTATIVE MAINTENANCE

GENERAL PERFORMANCE OBJECTIVE

Perform preventative maintenance by: preparing the equipment for inspection; determining the mechanical system components requiring scheduled maintenance; preparing service schedules for the client; obtaining approvals to proceed with schedule; performing the required maintenance; verifying the maintenance performed; re-commissioning the system; verifying full operational status; cleaning up the job site; and, submitting relevant documentation.

PERFORMANCE OBJECTIVES

Supervisor's Name (print)

Apprentice's Name (print)

SKILLS

U5483.01 Prepare the equipment for inspection by: washing, flushing, blowing down, and dumping using chemical solutions, pot feeder or bleaching system, in accordance with OHSA, EPA, WHMIS, manufacturers' recommendations, and client and/or company procedures.

Date Completed

Supervisor's Signature

Apprentice's Signature

U5483.02 Determine the mechanical system components which require scheduled maintenance by: reading drawings; and, following clients' operating and/or maintenance directories, manufacturers' specifications and/or maintenance recommendations.

Date Completed

Supervisor's Signature

Apprentice's Signature

U5483.0 PERFORM PREVENTATIVE MAINTENANCE -Cont'd

U5483.03 Prepare service schedules for the client by outlining the recommended maintenance procedures in compliance with manufacturers' specifications, maintenance directories, client/company procedures, applicable codes and municipal by-laws.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5483.04 Liaise with the client or client's representative in order to receive approval for the preventative/routine maintenance schedule, in accordance with company policies and procedures.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5483.05 Obtain approvals to proceed with the maintenance schedule from the client or client's representative, utilities, fire departments, monitoring companies, end users, and any other parties that may be affected, in accordance with company and/or client policy and procedures or other authorities.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5483.0 PERFORM PREVENTATIVE MAINTENANCE -Cont'd

U5483.06 Perform the required maintenance in a professional manner by ensuring that all tools, equipment, materials and qualified personnel are on site, and the work is performed in accordance with manufacturers' recommendations and to client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5483.07 Verify the maintenance performed by: inspecting and testing for items including fluid/chemical qualities, lubrication, temperatures, pressures, equipment functions and the combustion efficiencies, ensuring that maintenance procedures comply with the client's and/or company standards, applicable codes, municipal by-laws and manufacturers' recommendations.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5483.08 Re-commission the system after the maintenance/repairs are complete, tested and verified, by reactivating equipment/system(s) in accordance with client and/or company procedures and manufacturers' recommendations.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5483.09 Verify the full operational status of the system by checking that the calibration and balance conforms with the client's and/or company standards and manufacturers' recommendations.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5483.0 PERFORM PREVENTATIVE MAINTENANCE -Cont'd

U5483.10 Clean up the job site by removing excess debris, tools and equipment in accordance with OHSA, and client and/or company policies or standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5483.11 Submit relevant documentation including service reports and invoicing, upon completion of the maintenance performed, to conform with the client's and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

Employer's Name	Employer's Signature
_____	_____

U5484.0 TROUBLESHOOT AND REPAIR MECHANICAL SYSTEMS

GENERAL PERFORMANCE OBJECTIVE

Troubleshoot and repair mechanical systems by: diagnosing and assessing system problems; preparing a service proposal for the client; liaising with the client; arrange for maintenance; preparing systems for repairs; performing the required service; operating the systems on completion of repairs; verifying calibration of the system and/or components; re-commissioning the system; cleaning up the job site; and, submitting relevant documentation.

PERFORMANCE OBJECTIVES

Supervisor's Name (print)

Apprentice's Name (print)

SKILLS

U5484.01 Diagnose and assess system problem(s) by: communicating with the client/operator; verifying the operation of the systems; and, reading drawings, client's directories and manufacturers' specifications, in accordance with industry and company standards and procedures.

Date Completed

Supervisor's Signature

Apprentice's Signature

U5484.02 Prepare a service proposal for the client by: outlining the problem; recommending a course of action; recommending a schedule for the repair(s); and, giving written or verbal communications, in compliance with client and/or company procedures, applicable codes and municipal by-laws.

Date Completed

Supervisor's Signature

Apprentice's Signature

U5484.0 TROUBLESHOOT AND REPAIR MECHANICAL SYSTEMS -Cont'd

U5484.03 Liaise with the client or client's representative in order to outline the costing and to receive approval for the service, in compliance with client and/or company procedures and standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5484.04 Arrange for maintenance by: obtaining approvals from the client and notifying utilities, fire departments, monitoring companies, end users and any other . parties that may be affected by the proposed service, in accordance with companies and/or client procedures.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5484.05 Prepare the systems for the approved repairs by verifying that fuel, power, hydraulics, pneumatic systems, and operating control systems are isolated, de-energized, and locked-out as required, in accordance with OHSA, client and/or company procedures, manufacturers' specifications and recommendations.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5484.0 TROUBLESHOOT AND REPAIR MECHANICAL SYSTEMS -Cont'd

U5484.06 Perform the required service in a professional manner, ensuring that all tools, equipment, materials and qualified personnel are on site, and that the work is carried out in accordance with the client and/or company procedures and manufacturers' recommendations.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5484.07 Operate the system after all the repairs are complete, tested, and verified, ensuring that the repairs conform with the client and/or company standards and manufacturers' recommendations.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5484.08 Verify the calibration of the system and/or system components by operating the system and ensuring that the system operates in conformance with the client's and/or company standards and manufacturers' recommendations.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5484.0 TROUBLESHOOT AND REPAIR MECHANICAL SYSTEMS -Cont'd

U5484.09 Re-commission the system by notifying the end users, customers, utilities and enforcing authorities of the system status, ensuring that all locking/isolation devices are removed and the system and its components are operational, in accordance with the client's and/or company standards and manufacturers' recommendations

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5484.10 Clean up the job site by removing excess debris, tools and equipment in accordance with OHSA, and client and/or company policies and standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

U5484.11 Submit relevant documentation including service reports and invoicing upon completion of the maintenance performed, to conform with client and/or company standards.

Date Completed	Supervisor's Signature	Apprentice's Signature
_____	_____	_____

Employer's Name	Employer's Signature
_____	_____

**AREAS OF
COMPETENCY**



COMPETENCY ANALYSIS PROFILE

STEAMFITTER



PROTECT SELF AND OTHERS 5470.0	Identify, interpret and apply applicable Acts, Codes and regulations 5470.01	Select, wear adjust, use and maintain personal protective equipment 5470.02	Recognize and assess hazards and hazardous conditions 5470.03	Control Hazards 5470.04	Assemble, erect use and dismantle elevated platforms and scaffolds 5470.05
	Perform lock out and tagging procedures 5470.06	Select, operate and maintain tools and equipment 5470.07	Perform housekeeping duties 5470.08		
COMUNICATE 5471.0	Demonstrate effective interpersonal relations 5471.01	Receive and react to instructions 5471.02	Give instructions 5471.03	Read and interpret documents and/or job specifications 5471.04	Write job-related documents 5471.05
	Practice personal hygiene 5471.06				
READ, INTERPRET, AND MAINTAIN DRAWINGS AND SPECIFICATIONS 5472.0	Identify required drawings and specifications 5472.01	Identify and interpret industry symbols and abbreviations 5472.02	Identify and select drawing equipment 5472.03	Create drawings and sketches 5472.04	Identify the drawing approval process 5472.05
	Maintain documentation 5472.06				
ANALYSE AND DESIGN SYSTEMS 5473.0	Identify types of system 5473.01	Perform job-related calculations 5473.02	Determine system installation requirements 5473.03	Identify system equipment and devices to be installed 5473.04	Select the equipment to be installed. 5473.05
	Select the devices to be installed 5473.06	Layout and illustrate the piping system(s) 5473.07	Submit design documents for approval(s) 5473.08		

AREAS OF COMPETENCY



COMPETENCY ANALYSIS PROFILE

STEAMFITTER



PLAN AND PREPARE FOR THE PROJECT 5474.0	Prepare material and labour take off lists 5474.01	Complete all required applications and documentation 5474.02	Determine required installation tools and equipment 5474.03	Expedite job 5474.04	Establish a job schedule 5474.05
	Verify orders 5474.06	Store material, equipment and tools 5474.07			
LAYOUT AND INSTALL PIPE FITTINGS VALVES AND SUPPORTS 5475.0	Field check and verify site drawings 5475.01	Identify and select required piping materials 5475.02	Identify and select various pipe fittings 5475.03	Identify and select various control valves 5475.04	Identify and select various joining methods 5475.05
	Identify and select various pipe supports and hangers 5475.06	Create a series of structural openings 5475.07	Fabricate all required pipe supports, hangers sleeves, guides and anchors 5475.08	Install pipe supports, fabricated components and hangers 5475.09	Perform various cutting procedures 5475.10
	Join material 5475.11	Perform tube and pipe bending operations 5475.12	Prepare pipe and fittings 5475.13	Install and join pipe and fittings 5475.14	
ASSEMBLE AND INSTALL PROCESS PIPING SYSTEM 5476.0	Identify and select the process piping systems to be installed 5476.01	Verify pipe and fittings characteristics 5476.02	Identify and verify the installation location 5476.03	Install piping systems 5476.04	Label and tag installed piping systems 5476.05
	Install fire stopping measures 5476.06				

**AREAS OF
COMPETENCY**



COMPETENCY ANALYSIS PROFILE

STEAMFITTER



INSTALL AND MAINTAIN INSTRUMENTATION CONTROL SYSTEMS 5477.0	Identify and select piping requiring control system 5477.01	Identify the types and function of piping system instrumentation 5477.02	Determine the control system installation requirements 5477.03	Identify and select the control systems to be installed 5477.04	Install, calibrate and maintain control system(s) 5477.5
INSTALL EQUIPMENT 5478.0	Identify the equipment to be installed 5478.01	Verify the equipment characteristics 5478.02	Select the equipment to be installed 5478.03	Assemble the equipment 5478.04	Identify the installation location of the equipment 5478.05
	Install the equipment supports and hanger 5478.6	Install and connect the equipment to various piping 5478.7			
INSTALL DEVICES 5479.0	Install the devices 5479.01	Verify the device characteristics 5479.02	Select the devices used for the system 5479.03	Assemble the devices 5479.04	Identify the installation locations of the devices 5479.05
	Install device supports and hangers 5479.06	Install and connect the device to various equipment and piping systems 5479.07			
TEST SYSTEMS 5480.0	Identify and select the required tests for systems 5480.01	Determines the type, duration, pressures and set up requirements for test 5480.02	Perform and/or arrange destructive and non-destructive testing 5480.03	Perform visual inspection of various piping systems 5480.04	Perform stress relieving on trade related materials 5480.05
	Arrange for test or a testing schedule 5480.06	Perform piping system testing procedures 5480.07	Perform water treatment testing 5480.08	Receive and document test reports and results 5480.09	

AREAS OF COMPETENCY



COMPETENCY ANALYSIS PROFILE

STEAMFITTER



COMMISSION ACTIVATE SYSTEMS 5481.0	Identify the piping systems that require commissioning and/or activation 5481.01	Determine and perform the tests required for final inspections 5481.02	Flush and chemically treat systems 5481.03	Verify the calibration and operation of equipment and controls 5481.04	Instruct the end users 5481.05
	Check that the systems are commissioned/activated 5481.06				
PERFORM RIGGING AND HOISTING 5482.0	Read and interpret specifications and shop drawings 5482.01	Inspect the job site 5482.02	Determine the rigging and hoisting equipment required 5482.03	Schedule the rigging and hoisting operation 5482.04	Inspect the rigging and hoisting equipment 5482.05
	Connect the rigging equipment to the load 5482.06	Secure the hoisting area 5482.07	Perform the lift and moving operation 5482.08	Position and secure the load 5482.09	Disconnect the load 5482.10
	Remove and store the rigging equipment 5482.11	Communicate throughout the hoisting operation 5482.12	Operate power lifting and hoisting equipment 5482.13		
PERFORM PREVENTIVE MAINTENANCE 5483.0	Prepare the equipment for inspection 5483.01	Determine mechanical system components which require scheduled maintenance 5483.02	Prepare service schedules for the client 5483.03	Liaise with the client 5483.04	Obtain approvals to proceed with maintenance schedule 5483.05
	Perform the required maintenance 5483.06	Verify the maintenance performed 5483.07	Re-commission the system after maintenance/ 5483.08	Verify the full operational status of the system 5483.09	Clean up the job-site 5483.10
	Submit relevant documentation 5483.11				

**AREAS OF
COMPETENCY**



COMPETENCY ANALYSIS PROFILE

STEAMFITTER



TROUBLESHOOT AND REPAIR MECHANICAL SYSTEMS 5484.0	Diagnose and assess system problem(s) 5484.01	Prepare a service proposal 5484.02	Liaise with the client 5484.03	Arrange for maintenance 5484.04	Prepare the systems for the approved repairs 5484.05
	Perform the required service 5484.06	Operate the system after all repairs are completed 5484.07	Verify the calibration of the system and/or components 5484.08	Re-commission the system 5484.09	Clean up the job site 5484.10
	Submit the relevant documentation 5484.11				