Manitoba Curriculum Framework of Outcomes
Plumbing and Pipe Trades
2013 Draft

Acknowledgements
Manitoba Education gratefully acknowledges the contributions of the following individuals in the development of the Grade 9, Grade 10, Grade 11, and Grade 12 Plumbing and Pipe Trades: Manitoba Curriculum Framework of Outcomes:

Members of the Development Team
Shawn D Wedge  Lead Instructor  Piping Industry Technical College
Steve Ducharme       Training Director   Piping Industry Technical College
Kirk Baldwin             Divisional Principal   Seven Oaks School Division
Heiko P Wiechern   Chairman   Piping Industry Technical College

Manitoba Education School Programs Division Staff
Carole Bilyk   Development Unit
Coordinator   Instruction, Curriculum and Assessment Branch
Gilles Landry   Development Unit
Project Leader   Instruction, Curriculum and Assessment Branch
(since February, 2010)
Daniel Lemieux   Technical Vocational Education Unit
Consultant   Instruction, Curriculum and Assessment Branch
Peter Narth   Technical Vocational Education Unit
Coordinator   Instruction, Curriculum and Assessment Branch
Ken Nimchuk   Technical Vocational Education Unit
Consultant   Instruction, Curriculum and Assessment Branch
Description of Plumbing and Pipe Trades

A student graduating from the Plumbing and Pipe Trades program can seek entry level employment as an apprentice plumber, steam fitter, sprinkler fitter, HVAC technician, gas fitter, petroleum technician, pipeline worker, building maintenance, welder, power engineer, controls technician, instrument fitter, oilfield worker, fabrication worker, rigger and a waste water technician. In order to be qualified and continue as a Plumbing and Pipe Trades worker, students must seek apprenticeship and continue post-secondary training. Plumbing and Pipe Trades graduates are typically employed by general contractors, small plumbing shops, fabrication shops, the military, school divisions, building maintenance contractors, wholesale suppliers, pipelines and plant maintenance contractors. They also have the option of self-employment after completing their apprenticeship.

The Plumbing and Pipe Trades program is available to high school students as well as those who have already graduated or left high school.

The Plumbing and Pipe Trades program provides a foundation for students to go directly to work, continue into post-secondary education in Plumbing and Pipe Trades, steam fitter, sprinkler fitter, HVAC technician, gas fitter, petroleum technician, pipeline worker, building maintenance, welder, power engineer, controls technician, instrument fitter, oilfield worker, fabrication worker, rigger and a waste water technician.

Graduates of the Plumbing and Pipe Trades program will be able to demonstrate the following:

- perform basic installation of plumbing and piping systems
- complete documentation necessary to allow start-ups
- complete repairs and service to piping systems
- complete preventative maintenance procedures
- ability to understand and use modern piping techniques
- the ability to communicate and work with peers, employers, and customers
- logical thinking and decision making
- work independently or as part of a team
- demonstrate the ability for life-long learning to enhance their skills
- time management skills
- mechanical aptitude and manual dexterity
- problem-solving skills
- employability skills
Specific Learning Outcomes (SLOs) Repeated in all Courses

Development team members concluded that there is a great need for students to learn safety and employability skills, and for teachers to teach and assess those SLOs in every course. Therefore, with a few exceptions, all SLOs related to safety and employability skills are repeated in most courses in this Plumbing and Pipe Trades program.

Program Delivery

To receive a Senior Years Technical Education diploma, a student must complete eight departmentally developed courses from an approved technical-vocational cluster, together with 16 compulsory credits and six optional credits. The grade level in which the courses are offered are a local school based decision, but it is highly recommended that the sequencing of credits follow the schedule set out below.

Most courses include outcomes related to the fabrication, installation and maintenance of plumbing and pipefitting components and systems.

Cross-curricular learning outcomes include essential skills from subject areas including, but not limited to Information and Communication Technologies, Science, English Language Arts, and Mathematics and are to be integrated into the authentic activities of the course.

Outcomes dealing with the following topics are also integrated into most courses:

- health and safety
- sustainability
- ethical and legal standards
- employability skills
- working conditions and career opportunities
- evolution, technological progression and emerging trends

In most courses, the emphasis is on applied activities. For instructional purposes, the sequence of outcomes can vary based on the activities within the course. Teachers are advised to select the activities best suited to teach the outcomes, based on a variety of factors, including access to resources, or regional needs.

1. The curriculum is not sequential. In other words, outcomes might be taught in an order different from how they appear in the document.
2. In light of rapid changes in technology, teachers are encouraged to update their activities in order to meet the needs of students and industry.
Level 1 Apprenticeship

In order to teach the courses listed above, teachers must refer to the level one plumbing curriculum documents produced by Apprenticeship Manitoba which are found here: http://www.gov.mb.ca/tce/apprent/apprentice/curriculum

The Specific Learning Outcomes in the 8 mandatory high school courses include all of the objectives found in the Manitoba Apprenticeship Training for Level 1 Plumber. Some of the specific learning outcomes in this Framework of Outcomes include an alphanumeric reference in bold letter such as A2.1 at the end. This refers to Unit A1, Objective 2 of Plumber Level 1 from Apprenticeship Manitoba, which is on page 3 of the following document: http://www.gov.mb.ca/tce/apprent/forms/pdf/curriculum/plumber_lev1.pdf

In some cases, the Apprenticeship objectives have been reworded to make them more consistent with this Framework of Outcomes, or more appropriate for high school students.

The Apprenticeship documents provide necessary, detailed information and clarification of the high school Framework of Outcomes. Teachers must teach all of the objectives and content found in the Apprenticeship documents that are referenced in the Frameworks of Outcomes. This will ensure that students will have met all of the requirements for Level 1 certification from Apprenticeship Manitoba.

Plumbing and Pipe Trades programs delivering the 8 high school courses, which contain the 18 mandatory Apprenticeship MB courses, are eligible for accreditation with Apprenticeship Manitoba. For more information on accreditation, go here: http://www.gov.mb.ca/tce/apprent/educator/apprenticeship_school.html

Students obtaining an accumulated average of 70% or higher in the 8 mandatory courses in an accredited Plumbing and Pipe Trades program may be eligible for their Level 1 Apprenticeship for Plumber.
Curriculum Goals and General Learning Outcomes

The learning outcomes for each course in the plumbing and pipe trades program were developed based on the following program goals and general learning outcomes:

**Goal 1:** Describe and apply appropriate health and safety practices as they apply to plumbing and pipefitting.

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**Goal 2:** Demonstrate the safe and appropriate cleaning, maintenance and management of equipment tools and materials.

**GLO 2.1:** Demonstrate the safe and appropriate cleaning, maintenance and use of equipment, tools and materials.

**Goal 3:** Demonstrate an understanding of the characteristics and properties of various pipe and fittings.

**GLO 3.1** Demonstrate an understanding of the characteristics and properties of plastic pipe and fittings.

**GLO 3.2** Demonstrate an understanding of the characteristics and properties of copper tube and fittings.

**GLO 3.3** Demonstrate an understanding of the characteristics and properties of steel pipe and fittings.

**GLO 3.4** Demonstrate an understanding of the characteristics and properties of cast iron pipe and fittings.

**GLO 3.5** Demonstrate an understanding of the characteristics and properties of glass pipe and fittings.

**GLO 3.6** Demonstrate an understanding of the characteristics and properties of asbestos cement pipe and fittings.

**Goal 4:** Demonstrate an understanding of the characteristics and properties of various materials (other than pipe and tubing) used in plumbing and the pipe trades.

**GLO 4.1:** Demonstrate an understanding the characteristics and properties of various materials (other than pipe and tubing) used in plumbing and pipe trades.
Goal 5: Demonstrate an understanding of the design and layout of piping systems.

GLO 5.1: Demonstrate an understanding of the design of piping systems.

GLO 5.2: Demonstrate an understanding of the layout of piping systems.

Goal 6: Demonstrate an understanding of the joining, fabrication and installation of piping systems.

GLO 6.1: Demonstrate an understanding of the joining and fabrication of piping systems.

GLO 6.2: Demonstrate an understanding of the installation of piping systems.

Goal 7: Demonstrate an understanding of the documentation and testing of piping systems.

GLO 7.1: Demonstrate an understanding of the documentation and testing of piping systems.

Goal 8: Describe and demonstrate the transferable cross-curricular knowledge and skills as they pertain to plumbing & pipe trades.

GLO 8.1: Read, interpret and communicate information.

GLO 8.2: Apply the knowledge and skills from mathematics.

GLO 8.3: Apply the knowledge and skills from the sciences.

GLO 8.4: Apply the knowledge and skills from Information & Communication Technology.

Goal 9: Understand career opportunities in plumbing & the pipe trades.

GLO 9.1: Describe apprenticeship, education, career opportunities and professional organizations in plumbing and the pipe trades and associated fields.

Goal 10: Demonstrate awareness of sustainability as it pertains to plumbing & the pipe trades.

GLO 10.1: Describe the impact of human sustainability on the health and well-being of plumbers, and tradespersons working in the pipe trades, and those who use their products.

GLO 10.2: Describe the plumbing and pipe trade’s sustainability practices and impact on the environment.

GLO 10.3: Describe sustainable business practices within plumbing and the pipe trades.
Goal 11: Demonstrate awareness of the ethical and legal standards as they pertain to plumbing & the pipe trades.

GLO 11.1: Practice the ethical and legal standards as they pertain to plumbing and the pipe trades.

Goal 12: Demonstrate employability skills related to plumbing & the pipe trades.

GLO 12.1: Demonstrate fundamental employability skills

GLO 12.2: Demonstrate an understanding of the business operations of a plumbing and pipe trades facility.

Goal 13: Understand the history, technological progression and emerging trends in plumbing & the pipe trades.

GLO 13.1: Describe the history, technological progression and emerging trends in plumbing and the pipe trades.
Course Descriptions

**8859 Exploration of Plumbing and Pipe Trades** 15S 15E 15M
10S 10E 10M

This is an optional course intended for students wishing to sample Plumbing and Pipe Trades. The emphasis is on hands-on activities. Students are introduced to safety, tools and equipment, plumbing and piping systems and service procedures.

**8876 Introduction to Plumbing and Pipe Trades** 20S 20E 20M

A student wanting to develop skills in the plumbing and pipe trades must have knowledge of the basic principles related to piping systems and service. Students learn safety, tools and equipment, piping systems and service procedures and are introduced to diagnosis strategies.

**8877 Introduction to Piping Systems and Theories** 30S 30E 30M

A student wanting to develop skills in plumbing and pipe trades must have knowledge of the basic principles of layout, materials, codes and design. The student will learn the procedures to service, repair and install piping systems and their components.

**8878 Installation of Plumbing and Piping Systems I** 30S 30E 30M

A student wanting to develop skills in plumbing and pipe trades must have knowledge of the basic principles of supporting and installing a piping system. The student will be able to describe, draw out and demonstrate the ability to install plumbing and piping systems. The student will develop an understanding of the principles of grade and drainage and be able to apply those principles to diagnose plumbing and piping defects.

**8879 Installation of Plumbing and Piping Systems II** 30S 30E 30M

A student wanting to develop skills in plumbing and pipe trades must have knowledge of the basic principles of fixture installation and the calculations necessary to properly place and select those fixtures. The student will develop an understanding of the different methods that can be used to install systems and when to choose one over another.

**8981 Sanitary Venting Systems** 40S 40E 40M

A student wanting to develop skills in sanitary venting must have knowledge of the basic principles of grade, siphons and venturis. The student will understand the principles of venting and how it relates to plumbing and piping systems. The student will be able to draw a useable blueprint to assist in the installation of a sanitary venting system. The student will be able to install support and test a sanitary venting system. The student will have a working knowledge of all codes and regulations as they apply to sanitary venting.
8982 Sanitary Drainage Systems 40S 40E 40M

A student wanting to develop skills in sanitary drainage must have knowledge of the basic principles of grade, percentages and siphonage. The student will understand the principles of drainage and how it relates to plumbing and piping systems. The student will be able to draw a useable blueprint to assist in the installation of a sanitary drainage system. The student will be able to install support and test a sanitary drainage system. The student will have a working knowledge of all codes and regulations as they apply to sanitary drainage.

8984 Installation of Plumbing and Piping Systems III 40S 40E 40M

A student wanting to develop skills in plumbing and pipe trades must have knowledge of advanced installation techniques and new green technologies. The student will understand and implement the formulas and calculations they have learned to design and layout a drain-waste-vent (DWV) system, as well as a water supply system. The student will be able to design and install a water supply system and test a system of their design.

8985 Applied Plumbing and Piping Systems 40S 40E 40M

A student wanting to extend their skills in plumbing and pipe trades must be able to demonstrate the installation and selection of the appropriate fixtures. The student will be able to diagnose and correct plumbing and piping defects. The student will be able to use the newest techniques available and implement them wherever they are practical.

Curriculum Implementation Dates

During the Voluntary Implementation year, teachers in Manitoba have the option of teaching the new, draft curriculum the year before it is mandatory. They also have the choice to continue to teach the old curriculum during that year. Course codes for the new courses will be available. Course codes are found in the Subject Table Handbook: Technology Education, which is posted here: http://www.edu.gov.mb.ca/k12/docs/policy/sthte/index.html

Under System-Wide Implementation, all teachers in Manitoba teach the new curriculum. Teachers will no longer be able to use the old codes.

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