



# Boilermaker

# Guide to Course Content

2024

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*Recognition:*

*To promote transparency and consistency, portions of this document has been adapted from the 2016 Boilermaker Red Seal Occupational Standard (Employment and Social Development Canada).*

*A complete version of the Occupational Standard can be found at [www.red-seal.ca](http://www.red-seal.ca)*



# STRUCTURE OF THE **GUIDE TO COURSE CONTENT**

To facilitate understanding of the occupation, this guide to course content contains the following sections:

**Task Matrix:** a chart which outlines graphically the major work activities, tasks and sub-tasks of this standard detailing the essential skills and the level of training where the content is covered. The Task Matrix is broken down into the following:

**Major Work Activity (MWA):** the largest division within the standard that is comprised of a distinct set of trade activities.

**Task:** distinct actions that describe the activities within a major work activity.

**Sub-task:** distinct actions that describe the activities within a task.

**Training Profile Chart:** a chart which outlines the model for Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training.

**Technical Training Course Content for the Boilermaker trade:** a chart which outlines the model for SATCC technical training sequencing.

# TRAINING REQUIREMENTS FOR THE BOILERMAKER TRADE

To graduate from each level of the apprenticeship program, an apprentice must successfully complete the required technical training and compile enough on-the-job experience to total at least 1800 hours each year. Total trade time required is 5400 hours and at least 3 years in the trade.

There are three levels of technical training for the Boilermaker trade delivered by Red River Community College in Winnipeg, Manitoba:

Level One:	8 weeks
Level Two:	8 weeks
Level Three:	8 weeks

The information contained in this document details the technical training delivered for each level of apprenticeship. An apprentice spends approximately 15% of their apprenticeship term in a technical training institute learning the technical and theoretical aspects of the trade. The hours and percentages of technical and practical training may vary according to class needs and progress.

The content of the technical training components is subject to change without notice.

## Entrance Requirements for Apprenticeship Training

Your grade twelve transcripts (with no modified classes) or GED 12 is your guarantee that you meet the educational entrance requirements for apprenticeship in Saskatchewan. In fact, employers prefer and recommend apprentices who have completed high school. This ensures the individual has all of the necessary skills required to successfully complete the apprenticeship program, and receive journey person certification.

Individuals with “modified” or “general” classes in math or science do not meet our entry requirements. These individuals are required to take an entrance assessment prescribed by the SATCC.

English is the language of instruction in all apprenticeship programs and is the common language for business in Saskatchewan. Before admission, all apprentices and/or “upgraders” must be able to understand and communicate in the English language. Applicants whose first language is not English must have a minimum Canadian Language Benchmark Assessment of six (CLB6).

Note: A CLB assessment is valid for a one-year period from date of issue.

Designated Trade Name	Math Credit at the Indicated Grade Level <sup>❶</sup>	Science Credit at Grade Level
Boilermaker	Grade 11	Grade 10
<p>❶ - (One of the following) WA – Workplace and Apprenticeship; or F – Foundations; or P – Pre-calculus, or a Math at the indicated grade level (Modified and General Math credits are not acceptable.).</p> <p>*Applicants who have graduated in advance of 2015-2016, or who do not have access to the revised Science curricula will require a Science at the minimum grade level indicated by trade.</p> <p>For information about high school curriculum, including Math and Science course names, please see:  <a href="http://www.curriculum.gov.sk.ca">http://www.curriculum.gov.sk.ca</a></p> <p><b>Individuals not meeting the entrance requirements will be subject to an assessment and any required training</b></p>		

# BOILERMAKER TASK MATRIX CHART

This chart outlines the major work activities, tasks and sub-tasks from the 2017 Boilermaker Red Seal Occupational Standard. Each sub-task details the corresponding essential skill and level of training where the content is covered. \*

\* Sub-tasks with numbers in the boxes is where the content will be delivered in training.

## A - Performs Common Occupational Skills

**26%**

<b>A-1 Performs safety-related functions</b>	<b>1.01 Uses personal protective equipment (PPE) and safety equipment</b>  <b>1</b> <b>(2 &amp; 3 In Context)</b>	<b>1.02 Maintains safe work environment</b>  <b>1</b> <b>(2 &amp; 3 In Context)</b>	<b>1.03 Monitors confined spaces</b>  <b>1</b> <b>(2 &amp; 3 In Context)</b>		
<b>A-2 Uses tools, equipment and work platforms</b>	<b>2.01 Uses hand tools</b>  <b>1</b>	<b>2.02 Uses power tools</b>  <b>1, 2, 3</b>	<b>2.03 Uses shop equipment</b>  <b>1, 2, 3</b>	<b>2.04 Uses cutting and welding tools and equipment</b>  <b>1, 2, 3</b>	<b>2.05 Uses work platforms and access equipment</b>  <b>1, 2, 3</b>
<b>2.06 Uses aerial work platforms</b>  <b>1, 2, 3</b>					
<b>A-3 Organizes work</b>	<b>3.01 Organizes project tasks and procedures</b>  <b>1, 2, 3</b>	<b>3.02 Uses drawings and specifications</b>  <b>1, 2, 3</b>	<b>3.03 Handles materials and components</b>  <b>1, 2, 3</b>	<b>3.04 Demobilizes site</b>  <b>1, 2</b>	
<b>A-4 Uses communication and mentoring techniques</b>	<b>4.01 Uses communication techniques</b>  <b>1,</b> <b>(2 In Context)</b>	<b>4.02 Uses mentoring techniques</b>  <b>3,</b> <b>(2 In Context)</b>			

<b>A-5 Performs cutting and welding activities</b>	<b>5.01 Cuts material</b>	<b>5.02 Prepares joints for fitting</b>	<b>5.03 Fits joints</b>	<b>5.04 Performs tack welds</b>	<b>5.05 Performs basic welding</b>
	1, 2	1, 2, 3	1, 2, 3	1	1, 2, 3
	<b>5.06 Performs advanced welding</b>				
	3				

## B – Performs Rigging and Hoisting

**29%**

<b>B-6 Plans lift</b>	<b>6.01 Determines load</b>	<b>6.02 Performs pre-lift analysis</b>	<b>6.03 Selects rigging and hoisting equipment</b>	<b>6.04 Secures lift area</b>
	1, 2, 3	3	1, 2, 3	1
<b>B-7 Rigs load</b>	<b>7.01 Inspects rigging equipment</b>	<b>7.02 Fabricates rigging equipment</b>	<b>7.03 Attaches rigging equipment to load</b>	
	1, 2	3	1, 2	
<b>B-8 Hoists load</b>	<b>8.01 Inspects hoisting equipment</b>	<b>8.02 Assembles hoisting equipment</b>	<b>8.03 Performs hoisting operations</b>	<b>8.04 Secures load before rigging removal</b>
	1, 2	2, 3	1, 2, 3	2
<b>B-9 Performs post-lift activities</b>	<b>9.01 Conducts post-lift inspection</b>	<b>9.02 Disassembles hoisting equipment</b>	<b>9.03 Maintains rigging equipment</b>	
	1, 2	1, 2, 3	1	

## C – Completes New Construction

22%

<b>C-10 Performs fabrication</b>	<b>10.01 Lays out components for fabrication</b>  1, 2, 3	<b>10.02 Cuts components for fabrication</b>  1, 2	<b>10.03 Forms components for fabrication</b>  2, 3	<b>10.04 Constructs components</b>  1, 2, 3
<b>C-11 Assembles and fits vessels and components</b>	<b>11.01 Aligns vessels and components</b>  2, 3	<b>11.02 Fits vessels and components</b>  2, 3		

## D – Performs Repairs, Maintenance, Upgrading and Testing

21%

<b>D-13 Services vessels and components</b>	<b>13.01 Inspects vessels and components for defects</b>  2	<b>13.02 Prepares vessels and components for servicing</b>  1, 2, 3	<b>13.03 Repairs vessels and components</b>  2, 3	<b>13.04 Performs preventative maintenance and upgrades</b>  2, 3	<b>13.05 Tests materials, vessels and components</b>  2, 3
<b>D-14 Removes vessels and components</b>	<b>14.01 Dismantles vessels and components</b>  2, 3	<b>14.02 Removes materials</b>  3			



# TRAINING PROFILE CHART

This Training Profile Chart represents Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training at the topic level.

Level One	Unit Title	Hours
General Safety	Trade Safety Awareness	7
	Orientation I: Structure/Scope of Trade	7
	Common Hazards	14
	Safety Equipment, W.C.B. and Interpersonal and Essential Skills	11
	Emergency First Aid and C.P.R.	8
Basic Rigging	Ropes	19
	Hoisting	12
	Wire Rope and Attachments	10
Tools, Cutting and Welding	Hand and Power Tools	15
	Basic Materials	12
	Materials Preparation and Assembly	8
	Basic Drafting	24
	Introduction to Layout	8
Materials Knowledge	Electric Arc Welding	35
	Oxy-fuel Cutting	30
Drawing Interpretation	Trade Mathematics One	25
	Metallurgy One	15
	Trade Related Components	10
	Identification of Pressure Vessels	10
		280

Level Two	Unit Title	Hours
Tools, Cutting and Welding	Cutting, Welding and Related Processes	67
	Power Tools (Electric and Pneumatic)	15
	Instruments and Shop Equipment	25
	Metallurgy Two	7
Layout and Fitting	Drawing Interpretation One	24
	Layout and Fabricating	42
	Fibreglass Fitting	12
	Trade Mathematics Two	25
General Rigging	Block and Tackle	20
	Wire Rope Drums, Aerial Access and Equipment, and Scaffolds	15
	Lifting Practices	20
Materials and Related Knowledge	Heat Treatment	8
		280

Level Three	Unit Title	Hours
Materials and Related Knowledge	Business Practices	10
	Orientation II: Journeywork	7
	Advanced Metallurgy	10
	Inspection / Testing of Materials	20
Advanced Rigging	Hoisting and Jacking Equipment and Engineered Lifts	13
	Advanced Block and Tackle	12
	Advanced Cranes	10
Layout and Fitting	Drawing Interpretation Two	7
	Trade Mathematics	20
	Layout	30
	Fitting	30
Trade Related Components	Boilers	30
	Condensers and Exchangers	30
	Tanks	30
	Introductions to Other Heavy Industries	10
	Pre-IP Review: Examination Review	11
		280

# TECHNICAL TRAINING COURSE CONTENT

This chart outlines the model for Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training sequencing. For the harmonized level of training, a cross reference to the Red Seal Occupational Standard (RSOS) apprenticeship technical training sequencing, at the learning outcome level is provided.

Sub-tasks listed are the minimum to be covered in a topic. Related sub-tasks not listed may be used as a reference and taught “in context” in other topics.

<b>Level One</b>	<b>8 weeks</b>	<b>280 hours</b>
<b>General Safety</b>		<b>47 hours</b>
<ul style="list-style-type: none"><li>• Trade Safety Awareness</li><li>• Common Hazards</li><li>• Proper Use of Safety Equipment</li><li>• Workers' Compensation Board</li><li>• Interpersonal and Essential Skills</li><li>• Emergency First Aid and CPR</li></ul>		
<b>RSOS topics covered in this section of training:</b>		
<b>A-1 Performs Safety-related functions</b>		
A-1.01 Uses personal protective equipment (PPE) and safety equipment		
A-1.02 Maintains safe work environment		
A-1.03 Monitors confined spaces		
<b>A-2 Uses tools, equipment and work platforms</b>		
A-2.01 Uses hand tools		
A-2.02 Uses power tools		
A-2.03 Uses shop equipment		
A-2.04 Uses cutting and welding tools and equipment		
A-2.05 Uses work platforms and access equipment		
A-2.06 Uses aerial work platforms		
<b>A-3 Organizes work</b>		
A-3.01 Organizes project tasks and procedures		
A-3.02 Uses drawings and specifications		
A-3.03 Handles materials and components		
A-3.04 Demobilizes Site		
<b>Basic Rigging</b>		<b>41 hours</b>
<ul style="list-style-type: none"><li>• Ropes</li><li>• Hoisting</li><li>• Wire Ropes and Attachments</li></ul>		
<b>RSOS topics covered in this section of training:</b>		
<b>B-6 Plans lift</b>		
B-6.01 Determines load		
B-6.03 Selects rigging and hoisting equipment		
B-6.04 Secure lift area		

**B-7 Rigs load**

- B-7.01 Inspects rigging equipment
- B-7.03 Attaches rigging equipment to load

**B-8 Hoists load**

- B-8.01 Inspects hoisting equipment
- B-8.03 Performs hoisting operations

**B-9 Performs post-lift activities**

- B-9.01 Conducts post-lift inspection
- B-9.02 Disassembles hoisting equipment
- B-9.03 Maintains rigging equipment

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**Tools, Cutting and Welding****67 hours**

- Hand and Power Tools
- Basic materials
- Materials preparation and assembly
- Basic drafting
- Introduction to layout

**RSOS topics covered in this section of training:****A-2 Uses tools, equipment and work platforms**

- A-2.01 Uses hand tools
- A-2.02 Uses power tools
- A-2.03 Uses shop equipment
- A-2.04 Uses cutting and welding tools and equipment
- A-2.05 Uses work platforms and access equipment
- A-2.06 Uses aerial work platforms

**A-3 Organizes Work**

- A-3.01 Organizes project tasks and procedures
- A-3.02 Uses drawings and specifications
- A-3.03 Handles materials and components
- A-3.04 Demobilizes Site

**C-10 Performs fabrication**

- C-10.01 Lays out components for fabrication
- C-10.02 Cuts components for fabrication
- C-10.04 Constructs components

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**Materials Knowledge****65 hours**

- Electric Arc Welding
- Oxy-fuel Cutting

**RSOS topics covered in this section of training:****A-5 Performs cutting and welding activities**

- A-5.01 Cuts material
- A-5.02 Prepares joints for fitting
- A-5.03 Fits joints
- A-5.04 Performs tack welds
- A-5.05 Performs basic welding

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## Drawing Interpretation

60 hours

- Trade Mathematics One
- Metallurgy One
- Trade Related Components
- Identification of Pressure Vessels

### RSOS topics covered in this section of training:

#### **B-6 Plans lift**

- B-6.01 Determines load
- B-6.03 Selects rigging and hoisting equipment
- B-6.04 Secure lift area

#### **B-7 Rigs load**

- B-7.01 Inspects rigging equipment
- B-7.03 Attaches rigging equipment to load

#### **B-8 Hoists load**

- B-8.01 Inspects hoisting equipment
- B-8.03 Performs hoisting operations

#### **B-9 Performs post-lift activities**

- B-9.01 Conducts post-lift inspection
- B-9.02 Disassembles hoisting equipment
- B-9.03 Maintains rigging equipment

#### **C-10 Performs fabrication**

- C-10.01 Lays out components for fabrication
- C-10.02 Cuts components for fabrication
- C-10.04 Constructs components

#### **C-12 Fastens components**

- C-12.01 Bolts components

#### **D-13 Services vessels and components**

- D-13.02 Prepares vessels and components for servicing

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## Level Two

**8 weeks**

**280 hours**

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### Tools, Cutting and Welding

114 hours

- Cutting, Welding and Related Processes
- Power Tools (Electric and Pneumatic)
- Instruments and Shop Equipment
- Metallurgy Two

#### RSOS topics covered in this section of training:

##### A-2 Uses tools, equipment and work platforms

- A-2.02 Uses power tools
- A-2.03 Uses shop equipment
- A-2.04 Uses cutting and welding tools and equipment
- A-2.05 Uses work platforms and access equipment
- A-2.06 Uses aerial work platforms

##### A-5 Performs cutting and welding activities

- A-5.01 Cuts material
- A-5.02 Prepares joints for fitting
- A-5.03 Fits joints
- A-5.05 Performs basic welding

##### D-13 Services vessels and components

- D-13.01 Inspects vessels and components for defects
  - D-13.02 Prepares vessels and components for servicing
  - D-13.03 Repairs vessels and components
  - D-13.04 Performs preventative maintenance and upgrades
  - D-13.05 Tests materials, vessels and components
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### Layout and Fitting

103 hours

- Drawing Interpretation One
- Layout and Fabricating
- Fibreglass Fitting
- Trade Mathematics Two

#### RSOS topics covered in this section of training:

##### A-3 Organizes Work

- A-3.01 Organizes project tasks and procedures
- A-3.02 Uses drawings and specifications
- A-3.03 Handles materials and components
- A-3.04 Demobilizes Site

##### A-5 Performs cutting and welding activities

- A-5.01 Cuts material
- A-5.02 Prepares joints for fitting
- A-5.03 Fits joints
- A-5.05 Performs basic welding

##### B-6 Plans lift

- B-6.01 Determines load
- B-6.03 Selects rigging and hoisting equipment

##### B-7 Rigs load

- B-7.01 Inspects rigging equipment
- B-7.03 Attaches rigging equipment to load

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**B-8 Hoists load**

- B-8.01 Inspects hoisting equipment
- B-8.02 Assembles hoisting equipment
- B-8.03 Performs hoisting operations
- B-8.04 Secures load before rigging removal

**B-9 Performs post-lift activities**

- B-9.01 Conducts post-lift inspection
- B-9.02 Disassembles hoisting equipment

**C-10 Performs fabrication**

- C-10.01 Lays out components for fabrication
- C-10.02 Cuts components for fabrication
- C-10.03 Forms components for fabrication
- C-10.04 Constructs components

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**General Rigging****55 hours**

- Block and Tackle
- Wire Rope Drums, Aerial Access and Equipment, and Scaffolds
- Lifting Practices

**RSOS topics covered in this section of training:****A-2 Uses tools, equipment and work platforms**

- A-2.01 Uses hand tools
- A-2.02 Uses power tools
- A-2.03 Uses shop equipment
- A-2.04 Uses cutting and welding tools and equipment
- A-2.05 Uses work platforms and access equipment
- A-2.06 Uses aerial work platforms

**B-6 Plans lift**

- B-6.01 Determines load
- B-6.03 Selects rigging and hoisting equipment

**B-7 Rigs load**

- B-7.01 Inspects rigging equipment
- B-7.03 Attaches rigging equipment to load

**B-8 Hoists load**

- B-8.01 Inspects hoisting equipment
- B-8.02 Assembles hoisting equipment
- B-8.03 Performs hoisting operations
- B-8.04 Secures load before rigging removal

**B-9 Performs post-lift activities**

- B-9.01 Conducts post-lift inspection
- B-9.02 Disassembles hoisting equipment

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**Materials and Related Knowledge****8 hours**

- Heat Treatment

**RSOS topics covered in this section of training:****D-13 Services vessels and components**

- D-13.01 Inspects vessels and components for defects
- D-13.02 Prepares vessels and components for servicing
- D-13.03 Repairs vessels and components
- D-13.04 Performs preventative maintenance and upgrades
- D-13.05 Tests materials, vessels and components

**Level Two topics from the RSOS that are taught in context:*****A-1 Performs safety-related functions******A-4 Uses communication and mentoring techniques******For details regarding the In Context Topic, see page 19***



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## Level Three

8 weeks

280 hours

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### Materials and Related Knowledge

47 hours

- Business Practices
- Orientation II: Journeywork
- Advanced Metallurgy
- Inspection / Testing of Materials

#### RSOS topics covered in this section of training:

##### D-13 Services vessels and components

- D-13.02 Prepares vessels and components for servicing
  - D-13.03 Repairs vessels and components
  - D-13.04 Performs preventative maintenance and upgrades
  - D-13.05 Tests materials, vessels and components
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### Advanced Rigging

35 hours

- Hoisting and Jacking Equipment and Engineered Lifts
- Advanced Block and Tackle
- Advanced Cranes

#### RSOS topics covered in this section of training:

##### A-2 Uses tools, equipment and work platforms

- A-2.02 Uses power tools
- A-2.03 Uses shop equipment
- A-2.04 Uses cutting and welding tools and equipment
- A-2.05 Uses work platforms and access equipment
- A-2.06 Uses aerial work platforms

##### B-6 Plans lift

- B-6.01 Determines load
- B-6.02 Performs pre-lift analysis
- B-6.03 Selects rigging and hoisting equipment

##### B-7 Rigs load

- B-7.02 Fabricates rigging equipment

##### B-8 Hoists load

- B-8.02 Assembles hoisting equipment
- B-8.03 Performs hoisting operations

##### B-9 Performs post-lift activities

- B-9.02 Disassembles hoisting equipment
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### Layout and Fitting

87 hours

- Drawing Interpretation Two
- Trade Mathematics
- Layout
- Fitting

#### RSOS topics covered in this section of training:

##### A-3 Organizes Work

- A-3.01 Organizes project tasks and procedures
- A-3.02 Uses drawings and specifications

A-3.03 Handles materials and components

**C-10 Performs fabrication**

C-10.01 Lays out components for fabrication

C-10.03 Forms components for fabrication

C-10.04 Constructs components

**C-11 Assembles and fits vessels and components**

C-11.01 Aligns vessels and components

C-11.02 Fits vessels and components

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**Trade Related Components**

**111 hours**

- Boilers
- Condensers and Exchangers
- Tanks
- Introductions to Other Heavy Industries
- Pre-IP Review: Examination Review

**RSOS topics covered in this section of training:**

**C-12 Fastens components**

C-12.02 Expands tubes

**D-13 Services vessels and components**

D-13.02 Prepares vessels and components for servicing

D-13.03 Repairs vessels and components

D-13.04 Performs preventative maintenance and upgrades

D-13.05 Tests materials, vessels and components

**D-14 Removes vessels and components**

D-14.01 Dismantles vessels and components

D-14.02 Removes materials

**Level Three topics from the RSOS that are taught in context:**

***A-1 Performs Safety-related functions***

***A-4 Uses communication and mentoring techniques***

***For details regarding the In Context Topic, see page 19***

# In Context Topics

In Context means learning that has already taken place and is being applied to the applicable task. Learning outcomes for In Context topics are accomplished in other topics in that level.

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## **A-1 Performs Safety-related functions**

A-1.01 Uses personal protective equipment (PPE) and safety equipment

A-1.02 Maintains safe work environment

A-1.03 Monitors confined spaces

## **A-4 Uses communication and mentoring techniques**

A-4.01 Uses communication techniques

A-4.02 Uses mentoring techniques