



Insulator (Heat & Frost)

Guide to Course Content

2024

Online: www.saskapprenticeship.ca

Recognition:

To promote transparency and consistency, this document has been adapted from the 2018 Insulator (Heat & Frost) Red Seal Occupational Standard (Employment and Social Development Canada).

A complete version of the Occupational Standard can be found at 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: 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 Insulator (Heat & Frost) trade: a chart which outlines the model for SATCC technical training sequencing.

TRAINING REQUIREMENTS FOR THE INSULATOR (HEAT & FROST) 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 7200 hours and 4 years in the trade.

There are three levels of technical training delivered by the Insulator (Heat & Frost) Joint Training Committee in Regina, SK, SAIT and NAIT in AB:

Level One: 6 weeks

Level Two: 6 weeks

Level Three: 8 weeks

The information contained in this guide to course content 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 journeyman 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 ^❶	Science Credit at Grade Level
Insulator (Heat & Frost)	Grade 10	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: http://www.curriculum.gov.sk.ca/</p> <p>Individuals not meeting the entrance requirements will be subject to an assessment and any required training</p>		

INSULATOR (HEAT AND FROST)

TASK MATRIX CHART

This chart outlines the major work activities, tasks and sub-tasks from the 2018 Insulator (Heat & Frost) 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 Routine Occupational Skills

12%

A-1 Performs safety-related functions	A-1.01 Uses personal protective equipment (PPE) and safety equipment 1,2,3	A-1.02 Maintains safe work environment 1,2,3	
A-2 Uses and maintains tools and equipment	A-2.01 Uses tools and equipment 1,2,3	A-2.02 Uses access equipment 1,2,3	
A-3 Organizes work	A-3.01 Performs task scheduling 1	A-3.02 Organizes materials on site 1	
A-4 Uses communication and mentoring techniques	A-4.01 Uses communication techniques 1 (2, 3 In-Context)	A-4.02 Uses mentoring techniques 3	
A-5 Performs routine trade practices	A-5.01 Performs measurements and calculations 1, 2, 3	A-5.02 Interprets specifications and drawings 2, 3	A-5.03 Prepares substrates 1, 2

B - Performs Industrial Applications

31%

B-6 Prepares for installation of insulation in industrial applications	B-6.01 Selects materials for industrial applications 1, 2, 3	B-6.02 Performs layout for industrial applications 1, 2, 3	
B-7 Insulates piping and fittings	B-7.01 Installs insulation on piping, fittings and hangers 1	B-7.02 Applies vapour barrier on piping and fittings 1	B-7.03 Installs cladding, jacketing and finishes on piping and fittings 3
B-8 Insulates tanks, vessels and equipment	B-8.01 Installs insulation on tanks, vessels and equipment 2	B-8.02 Applies vapour barrier on tanks, vessels and equipment 2	B-8.03 Installs cladding, jacketing and finishes on tanks, vessels and equipment 3

C - Performs Commercial Applications

30%

C-9 Prepares for installation of insulation in commercial applications	C-9.01 Selects materials for commercial applications 1, 2	C-9.02 Performs layout for commercial applications 1, 2	
C-10 Insulates plumbing and mechanical piping systems	C-10.01 Installs insulation on plumbing and mechanical piping systems 1	C-10.02 Applies vapour barrier on insulated plumbing and mechanical piping systems 1	C-10.03 Installs cladding, jacketing and finishes on insulated plumbing and mechanical piping systems 2
C-11 Insulates mechanical ducting	C-11.01 Installs insulation on mechanical ducting 2	C-11.02 Applies vapour barrier on insulated mechanical ducting 2	C-11.03 Installs cladding, jacketing and finishes on insulated mechanical ducting 3

C-12 Insulates mechanical equipment	C-12.01 Installs insulation on mechanical equipment 2	C-12.02 Applies vapour barrier on insulated mechanical equipment 2	C-12.03 Installs cladding, jacketing and finishes on insulated mechanical equipment 3
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D - Performs Applications Common to Industrial and Commercial Systems

12%

D-13 Installs fire stop systems	D-13.01 Identifies approved fire stop system 2	D-13.02 Applies fire stop materials to architectural, structural, mechanical and electrical components 2		
D-14 Insulates for soundproofing	D-14.01 Insulates piping for soundproofing 2	D-14.02 Insulates turbines, equipment and mechanical systems for soundproofing 2	D-14.03 Fabricates acoustic panels (Not Common Core) 2	D-14.04 Installs acoustic panels to ceilings and walls (Not Common Core) 2
D-15 Installs removable covers	D-15.01 Fabricates removable covers 3	D-15.02 Fastens removable covers 3		
D-16 Installs underground insulating systems	D-16.01 Installs pipe insulation to underground systems 2	D-16.02 Installs pour-in-place and spray-on insulation to underground systems 2		

E - Performs Specialized Applications

9%

<p>E-17 Sprays sealers, coatings and spray-on insulation</p>	<p>E-17.01 Protects surrounding work area for spraying</p> <p>2</p>	<p>E-17.02 Prepares material, equipment and substrate for spraying</p> <p>2</p>	<p>E-17.03 Installs reinforcing material for spraying</p> <p>2</p>	<p>E-17.04 Applies spray-on insulation, coatings and sealers</p> <p>2</p>
<p>E-18 Installs fireproofing</p>	<p>E-18.01 Applies fireproofing to architectural, structural, mechanical and electrical components</p> <p>2</p>	<p>E-18.02 Applies protective covering to fireproofing materials</p> <p>2</p>		
<p>E-19 Installs insulation for refractory systems</p>	<p>E-19.01 Applies insulation to refractory systems</p> <p>2</p>	<p>E-19.02 Installs reflective systems</p> <p>2</p>	<p>E-19.03 Installs cladding, jacketing and finishes to refractory systems</p> <p>2</p>	
<p>E-20 Installs insulation for cryogenic systems</p>	<p>E-20.01 Applies insulation to cryogenic systems</p> <p>2</p>	<p>E-20.02 Applies vapour barrier to insulated components of cryogenic systems</p> <p>2</p>	<p>E-20.03 Installs cladding, jacketing and finishes to cryogenic systems</p> <p>2</p>	
<p>E-21 Insulates for marine applications (Not Common Core)</p>	<p>E-21.01 Insulates bulkheads, deckheads and hulls</p> <p>(Not Common Core) 2</p>	<p>E-21.02 Installs cladding, jacketing and finishes on marine applications</p> <p>(Not Common Core) 2</p>		

F - Performs Asbestos, Lead and Mould Abatement

6%

F-22 Prepares for asbestos abatement	F-22.01 Determines required personal protective equipment (PPE) for asbestos abatement 1	F-22.02 Retrieves sample of asbestos for testing 1	F-22.03 Determines scope of work 1	F-22.04 Prepares site for removal and containment of asbestos 1
	F-22.05 Builds temporary enclosure 1			
F-23 Performs asbestos removal procedures	F-23.01 Removes asbestos 1	F-23.02 Disposes of asbestos materials 1	F-23.03 Performs decontamination of area and equipment 1	
F-24 Performs maintenance and repair	F-24.01 Encapsulates asbestos 1	F-24.02 Encloses asbestos 1		
F-25 Performs lead abatement and mould remediation	F-25.01 Performs lead abatement 1	F-25.02 Performs mould remediation 1		

TRAINING PROFILE CHART

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

Level One	Hours
Orientation and Safety	23
Insulation Accessories, Tools and Equipment	12
Blueprint Reading and Pattern Development	27
Insulation Materials, applications and Safety	82
Asbestos Abatement	18
Trade Mathematics (Exceeds)	18
	180

Level Two	Hours
Safety, Noise Control and Exposure to Heat and Cold	6
Canvas on Piping, Ducts and Equipment	24
Polyvinyl Chloride Pipe Covering	18
Introduction to Metals	18
Miscellaneous Applications (*Includes Firestop Systems)	12
Blueprint Reading and Pattern Development	78
Trade Mathematics (Exceeds)	24
	180

Level Three	Hours
Safety, Tools and Codes (Exceeds)	6
Metal Fabrication	39
Equipment Layout	36
Pipe Rack Layout	39
Extruded Foam Pattern Development	24
Blueprint Reading and Pattern Development	48
Trade Mathematics (Exceeds)	48
	240

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.

Level One	6 weeks	180 hours
Orientation and Safety		23 hours
<ul style="list-style-type: none">• apprenticeship overview• OH&S regulations and safety• Occupational Exposure Limits (OEL) and control measures• safe work practices• K and R factor principals• pipe sizes		
RSOS topics covered in this section of training:		
A-1 Safety-related functions		
A-1.01 Uses personal protective (PPE) and safety equipment		
A-1.02 Maintains safe work environment		
Insulation Accessories, Tools and Equipment		12 hours
<ul style="list-style-type: none">• mastics and cements• mitres• metal mesh, wire and bands• hand and power tools• material handling		
RSOS topics covered in this section of training:		
A-2 Uses and maintains tools and equipment		
A-2.01 Uses tools and equipment		
A-2.02 Uses access equipment		
B-6 Prepares for installation of insulation in industrial applications		
B-6.01 Selects materials for industrial applications		
B-6.02 Performs layout for industrial applications		
B-7 Insulates piping and fittings		
B-7.01 Installs insulation on piping, fittings and hangers		
B-7.02 Applies vapour barriers on piping and fittings		
C-9 Prepares for installation of insulation in commercial applications		
C-9.01 Selects materials for commercial applications		
C-9.02 Performs layout for commercial applications		
C-10 Insulates plumbing and mechanical piping systems		
C-10.01 Installs insulation on plumbing and mechanical piping systems		
C-10.02 Applies vapour barriers on insulated plumbing and mechanical piping systems		

Insulation Materials, Application and Safety

82 hours

- insulation types, including fasteners
- fibreglass pipe covering
- fibreglass rigid and flex duct insulation
- acoustic insulation (fibreglass and mineral wool)
- Foamglass and Pittwrap
- mineral wool
- calcium silicate and ceramic fibres
- extruded foam plastic
- polystyrenes and polyurethanes

RSOS topics covered in this section of training:

B-6 Prepares for installation of insulation in industrial applications

B-6.01 Selects materials for industrial applications

B-6.02 Performs layout for industrial applications

B-7 Insulates piping and fittings

B-7.01 Installs insulation on piping, fittings and hangers

B-7.02 Applies vapour barriers on piping and fittings

C-9 Prepares for installation of insulation in commercial applications

9.01 Selects materials for commercial applications

9.02 Performs layout for commercial applications

C-10 Insulates plumbing and mechanical piping systems

10.01 Installs insulation on plumbing and mechanical piping systems

10.02 Applies vapour barriers on insulated plumbing and mechanical piping systems

Blueprint Reading and Pattern Development

27 hours

- lines, scale rulers, symbols
- pictorial and orthographic drawings
- divisions of blueprints and print assessment

RSOS topics covered in this section of training:

A-3 Organizes work

- A-3.01 Performs task scheduling
- A-3.02 Organizes materials on site

A-4 Uses communication and mentoring techniques

- A-4.01 Uses communication techniques

A-5 Performs routine trade practices

- A-5.01 Performs measurements and calculations
- A-5.03 Prepares substrates

Asbestos

18 hours

- asbestos history and types
- methods of control, health effects and respirators
- site preparation, equipment and disposal
- regulations
- OH&S regulations and examinations

RSOS topics covered in this section of training:

F-22 Prepares for asbestos abatement

- F-22.01 Determines required personal protective equipment (PPE) for asbestos abatement
- F-22.02 Retrieves sample of asbestos for testing
- F-22.03 Determines scope of work
- F-22.04 Prepares site for removal and containment of asbestos
- F-22.05 Builds temporary enclosure

F-23 Performs asbestos removal procedures

- F-23.01 Removes asbestos
- F-23.02 Disposes of asbestos materials
- F-23.03 Performs decontamination of area and equipment

F-24 Performs maintenance and repair

- F-24.01 Encapsulates asbestos
- F-24.02 Encloses asbestos

F-25 Performs lead abatement and mould remediation

- F-25.01 Performs lead abatement
- F-25.02 Performs mould remediation

Trade Mathematics (Exceeds)

18 hours

- whole numbers
- fractions and decimals
- conversions and percentages
- perimeters and area
- band spacing
- board feet

This section of training exceeds the minimum sequencing as set out in the Insulator (Heat & Frost) RSOS

Level Two

6 weeks

180 hours

Safety, Noise Control and Exposure to Heat and Cold

6 hours

- piping materials
- safety and noise control
- exposure to heat and cold

RSOS topics covered in this section of training:

A-5 Performs routine trade practices

- A-5.01 Performs measurements and calculations
- A-5.02 Interprets specifications and drawings (Introduction)
- A-5.03 Prepares substrates

B-6 Prepares for installation of insulation in industrial applications

- B-6.01 Selects materials for industrial applications
- B-6.02 Performs layout for industrial applications

E-19 Installs insulation for refractory systems

- E-19.01 Applies insulation to refractory systems
 - E-19.02 Installs reflective systems
 - E-19.03 Installs cladding, jacketing and finishes to refractory systems
-

Canvas on Piping, Ducts and Equipment

24 hours

- application identification and surface preparation
- practical application
- stud welder use

RSOS topics covered in this section of training:

B-8 Insulates tanks, vessels and equipment

- B-8.01 Installs insulation on tanks, vessels and equipment
- B-8.02 Applies vapour barriers on tanks, vessels and equipment

C-9 Prepares for installation of insulation in commercial applications

- C-9.01 Selects materials for commercial applications
- C-9.02 Performs layout for commercial applications

D-14 Insulates for soundproofing

- D-14.01 Insulates piping for soundproofing
- D-14.02 Insulates turbines, equipment and mechanical systems for soundproofing
- D-14.03 Fabricates acoustic panels (Not Common Core)
- D-14.04 Installs acoustic panels to ceilings and walls (Not Common Core)

E-17 Sprays sealers, coatings and spray-on insulation

- E-17.01 Protects surrounding work area for spraying
 - E-17.02 Prepares material, equipment and substrate for spraying
 - E-17.03 Installs reinforcing material for spraying
 - E-17.04 Applies spray-on insulation, coatings and sealers
-

Polyvinyl Chloride Pipe Covering

18 hours

- pipe covering application types
- surface preparation
- practical application

RSOS topics covered in this section of training:

C-10 Insulates plumbing and mechanical piping systems

- C-10.03 Installs cladding, jacketing and finishes on insulated plumbing and mechanical piping systems

C-11 Insulates mechanical ducting

C-11.01 Installs insulation on mechanical ducting

C-11.02 Applies vapour barrier on insulated mechanical ducting

C-12 insulates mechanical equipment

C-12.01 Installs insulation on mechanical equipment

C-12.02 Applies vapour barriers on insulated mechanical equipment

Introduction to Metals**18 hours**

- line and circle division
- shop equipment and layout tools
- bevels
- equal and unequal tees
- end caps
- gore and butterfly elbows

RSOS topics covered in this section of training:**A-5 Performs routine trade practices**

A-5.01 Performs measurements and calculations

A-5.02 Interprets specifications and drawings

A-5.03 Prepares substrates

B-6 Prepares for installation of insulation in industrial applications

B-6.01 Selects materials for industrial applications

B-6.02 Performs layout for industrial applications

E-20 Installs insulation for cryogenic systems

E-20.01 Applies insulation to cryogenic systems

E-20.02 Applies vapour barrier to insulated components of cryogenic systems

E-20.03 Installs cladding, jacketing and finishes to cryogenic systems

E-21 Insulates for marine applications (Not Common Core)

E-21.01 Insulates bulkheads, deckheads and hulls (Not Common Core)

Miscellaneous Applications**12 hours**

- underground systems
- breeching
- expansion joints
- fireproofing/firestopping

RSOS topics covered in this section of training:**D-13 Installs fire stop system**

D-13.01 Identifies approved fire stop system

D-13.02 Applies fire stop materials to architectural, structural, mechanical and electrical components

D-16 Installs underground insulating systems

D-16.01 Installs pipe insulation to underground systems

D-16.02 Installs pour-in-place and spray-on insulation to underground systems

E-18 Installs fireproofing

E-18.01 Applies fireproofing to architectural, structural, mechanical and electrical components

E-18.02 Applies protective covering to fireproofing materials

Blueprint Reading and Pattern Development**78 hours**

- orthographic drawings
- isometric drawings

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- specifications and addendums
 - commercial and industrial systems
 - mechanical drawings and symbols

RSOS topics covered in this section of training:

B-8 Insulates tanks, vessels and equipment

B-8.01 Installs insulation on tanks, vessels and equipment

B-8.02 Applies vapour barriers on tanks, vessels and equipment

C-9 Prepares for installation of insulation in commercial applications

C-9.01 Selects materials for commercial applications

C-9.02 Performs layout for commercial applications

Trade Mathematics (Exceeds)

24 hours

- trade problems
- insulation on ducts and band spacing
- lags
- metal and canvas on ducts

This section of training exceeds the minimum sequencing as set out in the Insulator (Heat & Frost) RSOS.

Level Two topics from the RSOS taught in context:

A-2 Uses and maintains tools and equipment

A-4 Uses communication and mentoring techniques

B-7 Insulates piping and fittings

For details regarding the In-Context topics, see page 21

Level Three

8 weeks

240 hours

Safety, Tools and Codes (Exceeds)

6 hours

- regulations and building codes
- hand and power tool use and safety
- heat loss detection

RSOS topics covered in this section of training:

A-1 Safety-related functions

- A-1.01 Uses personal protective (PPE) and safety equipment
- A-1.02 Maintains safe work environment

A-4 Uses communication and mentoring techniques

- A-4.02 Uses Mentoring Techniques

B-6 Prepares for installation of insulation in industrial applications

- B-6.01 Selects materials for industrial applications
 - B-6.02 Performs layout for industrial applications
-

Metal Fabrication

39 hours

- pattern development and line and circle division
- schedules of metals, fasteners and pipe sizes

RSOS topics covered in this section of training:

A-5 Performs routine trade practices

- A-5.01 Performs measurements and calculations
- A-5.02 Interprets specifications and drawings

B-6 Prepares for installation of insulation in industrial applications

- B-6.01 Selects materials for industrial applications
- B-6.02 Performs layout for industrial applications

E-21 Insulates for marine applications (Not Common Core)

- E-21.01 Insulates bulkheads, deckheads, and hulls (Not Common Core)
-

Equipment Layout

36 hours

- spherical and elliptical heads
- box coverings
- concentric reducers
- eccentric reducers
- transitions

RSOS topics covered in this section of training:

B-6 Prepares for installation of insulation in industrial applications

- B-6.01 Selects materials for industrial applications
 - B-6.02 Performs layout for industrial applications
-

Pipe Rack Layout

39 hours

- bevels
- end caps
- equal and unequal tees
- gore and butterfly elbows
- laterals
- removable covers

RSOS topics covered in this section of training:

B-8 Insulates tanks, vessels and equipment

B-8.03 Installs cladding, jacketing and finishes on tanks, vessels and equipment

C-11 Insulates mechanical ducting

11.03 Installs cladding, jacketing and finishes on insulated mechanical ducting

Extruded Foam Pattern Development

24 hours

- extruded foam concepts
- elbows
- reducers and reducing elbows
- extruded foam plastics for pumps

RSOS topics covered in this section of training:

B-7 Insulates piping and fittings

B-7.03 Installs cladding, jacketing and finishes on piping and fittings

B-8 Insulates tanks, vessels and equipment

8.03 Installs cladding, jacketing and finishes on tanks, vessels and equipment

C-12 Insulates mechanical equipment

12.03 Installs cladding, jacketing and finishes on insulated mechanical equipment

Blueprint Reading and Pattern Development

48 hours

- blueprint reading and material take-offs
- commercial and industrial systems
- estimating

RSOS topics covered in this section of training:

B-6 Prepares for installation of insulation in industrial applications

B-6.01 Selects materials for industrial applications

B-6.02 Performs layout for industrial applications

D-15 Installs removable covers

15.01 Fabricates removable covers

15.02 Fastens removable covers

Trade Mathematics (Exceeds)

48 hours

- trade problems
- mathematical operations for insulation on ducts and band spacing
- mathematical operations for calculating lags
- mathematical operations for calculating metal and canvas on ducts

This section of training exceeds the minimum sequencing as set out in the Insulator (Heat & Frost) RSOS.

Level Three topics from the RSOS taught in context:

A-2 Uses and maintains tools and equipment

For details regarding the In-Context Topics, see page 21

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.

A-1 Safety-related functions

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

A-1.02 Maintains safe work environment

A-2 Uses and maintains tools and equipment

A-2.01 Tools and equipment

A-2.02 Uses access equipment

A-4 Uses communication and mentoring techniques

A-4.01 Uses Communication Techniques

A-4.02 Uses mentoring techniques

B-6 Prepares for installation of insulation in industrial applications

B-6.01 Selects materials for industrial applications

B-6.02 Performs layout for industrial applications

B-7 Insulates piping and fittings

B-7.01 Installs insulation on piping, fittings and hangers

B-7.02 Applies vapour barriers on piping and fittings

C-9 Prepares for installation of insulation in commercial applications

C-9.01 Selects materials for commercial applications

C-9.02 Performs layout for commercial applications