# Nova Scotia Power Engineers & Plant Maintenance Education Forum



# 2022 Organizing Committee

- Danny Wagner; Chairperson IPE/NSCC
- Ryan Hobb; Tradeshow Coordinator- IPE/Michelin
- Josh Surette; Vice Chairperson IPE/Eastward Energy
- Sarah Lumsden; Vice Chairperson IPE/DND
- Rick Deveau IPE/DND
- Jordan McPhee IPE Student Representative
- Shawna Publicover Labour, Skills, & Immigration
- Jamie Swindells Labour, Skills, & Immigration
- Ella Hanson; Photographer

#### Day 1 Wednesday November 16th, 2022

11:00 - 12:00Registration 12:00 - 12:15Forum Opening, Welcome Message, and Important Information 12:15 - 13:00 Measurement Devices – Phil Reid; Swagelok Review of Examination Results - Don Ehler; LSI 13:00 - 13:2013:20 - 13:50 SOPEEC Update - Jude Rankin; IPE 13:50 - 14:10Technical Safety Branch Update - Jeff Dolan; LSI 14:10 - 14:30 Apprenticeship Update - Don Adams; LSI 14:30 - 15:15 Diversity & Inclusion – Tracy Boyer; Shift Change 15:15 - 15:30 Break 15:30 - 16:00NSCC Program Update – Don Jardine; NSCC Academic Chair 16:00 - 16:30Immigration and Skilled Trades Update – Tina Hennigar; Navigator Services 16:30 - 17:15Refrigeration & B52 Mechanical Room Review – Jamie Swindells; LSI 1<sup>st</sup> Class Certification Recognition of Achievement 2020/2021/2022 17:15 - 17:45Break 17:45 - 18:0018:00 - 19:30 **Dinner - Best Western** 

#### Day 2 Thursday November 17th, 2022

- 8:45 9:00 Blessing from Gary Joseph; Aboriginal Elder in Residence/Sun Dancer at NSCC
- 9:00 9:15 Opening Message & Feedback Papers
- 9:15 10:00 Preparing for a Changing Workforce Don Jardine & Patty Charlton; NSCC
- 10:00 10:30 Coffee and Trade Show
- 10:30 11:00 Solar Conversions, Residential & Commercial George Solomon; Efficiency NS
- 11:00 11:30 Regulated Work & Lockout Tagout Requirements Don Hartt; LSI
- 11:30 12:00 Arc Flash Josh Hyslop; NSPI
- 12:00 12:15 IPE Presidents Report and Update Clayton White; NSIPE
- 12:15 12:30 Ontario Path 1 & 2 Review Sarah Lumsden; NSIPE
- 12:30 14:00 Lunch & Trade Show
- 14:00 14:45 Hydrogen Presentation Jordan MacNeil; Eastward Energy
- 14:45 15:00 Question Period, Closing Remarks, & Feedback

# **Major Sponsors**

Nova scotia Institute of Power Engineers

• Labour, Skills and Immigration



NOVA SCOTIA

Department of Labour, Skills, and Immigration

Maritime Pressure Works



Eastward Energy



# Fluid Systems Measurement Devices Introduction

Swagelok

Swagelok Ontario | Atlantic Canada

# SUPPORT BY SWAGELOK



## **How We Can Help**

### The Right Resources At The Right Time

- Local Engineering Team in Ontario & Atlantic Canada
- Specialists Support You On-Site or Remotely
- Experts in Training (over 40 courses) and On-Site Evaluations
- Think of us as...



## Phil Reid, Training and Technical Support Manager





Mechanical Design Engineering graduate-Fleming College 35 years with the Swagelok organization

Manage a Technical Support team of Field Engineering, Training and Technical services resources

Swagelok

Swagelok Central Ontario | Atlantic Canada

# **Introduction to Measurement:**

- Pressure Gauges
- Transducers (Transmitters)
- Flowmeters
- Thermometers



# Agenda

- Pressure Gauge Operating
   Principles-Bourdon Tube
- Transducers/Transmitters
- Flowmeters-VAF
- Thermometers-Bi-Metal



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# ASME B40.100 2013 Edition

This standard is a consolidation and revision of the following five individual standards:

B40.1 Pressure Indicating Dial Type – Elastic Element Gauges
B40.2 Diaphragm Seals
B40.5 Snubbers
B40.6 Pressure Limiter Valves
B40.7 Pressure Digital Indicating Gauges.

These individual standards provide terminology and definitions, dimensions, safety, construction and installation issues, test procedures and general recommendations.



AN AMERICAN NATIONAL STANDARD



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ASME B40.100-2013

[Revision of ASME 840.100-2005 (R2011)]

# Swagelok Standard Pressure Gauges

Stocked and Readily Available When You Need Them

# What is a Pressure Gauge?



Pressure gauges mechanically sense fluid pressure and convert it to mechanical motion.









**Gauge Components** 



# **Bourdon Tube Designs**

Swagelok



C-shape Tubes are used for 10 PSI to 1000 PSI systems

# **Bourdon Tube Designs**







### C-shape Tubes are used for 10 PSI to 1000 PSI systems



# **High Pressure Bourdon Tube Designs**

Swagelok



• Helical Tubes are used for 1000 PSI and above systems



### Helical Tubes are used for 1000 PSI and above systems



# **Types of Gauges**

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© 2020 Swagelok Company

## **Types of Gauges**







# **Types of Gauges**









# Accuracy Grade

ASME Standard - B40.1				Middle third
Accuracy Grade	Lower 1/3 of Scale	Middle 1/3 of Scale	Upper 1/3 of Scale	No. of the other states of
	% of Span			11 - 20 Swaaphole m - 20
4A	± 0.1	± 0.1	± 0.1	
ЗA	± 0.25	± 0.25	± 0.25	11 7 7
2A	± 0.50	± 0.50	± 0.50	1 ×1
1A	± 1.0	± 1.0	± 1.0	
A	± 2.0	± 2.0	± 2.0	marte bar au
в	± 3.0	± 3.0	± 3.0	Lower Upper
С	± 4.0	± 4.0	± 4.0	ASME B40 1 divides span
D	± 5.0	± 5.0	<b>±</b> 5.0	into 3 equal portions

# A diaphragm seal is ideal for severe duty applications

- Pressure spikes
- Pulsation
- High temperatures
- Corrosive media
- Suspended solids
- Highly viscous, crystallizing or clogging media
- Acts as a chemical barrier and/or thermal barrier







## A diaphragm seal is ideal for severe duty applications



### **The Most Common Gauge Failures**





![](_page_29_Picture_0.jpeg)

# **Needed Information for Proper Gauge Selection**

- 1. Composition-Pressure fluid
- 2. Temperature-Pressure fluid
- 3. Ambient conditions
- 4. Pressure range
- 5. Conditions affecting wear of the system
- 6. Method of mounting
- 7. Required accuracy

![](_page_29_Picture_9.jpeg)

# **Pressure Gauge**

# **Questions?**

![](_page_30_Picture_2.jpeg)

PTI Series Industrial Pressure Transducers Standard (S-Model) Explosion-Proof (E-Model)

![](_page_31_Picture_1.jpeg)

© 2020 Swagelok Company

### What is a Pressure Transducer?

Pressure transducers are electronic instruments for sensing pressure.

They convert an applied pressure into an electrical signal.

The signal can be sent to computers, programmable logic controllers (PLCs), digital recorders, digital panel meters, or other devices that interpret the electrical signal and use it to display, record, and/or change the pressure in the system that is being monitored.

![](_page_32_Picture_6.jpeg)

![](_page_32_Picture_7.jpeg)

# Where and why would we use a transducer rather than a gauge?

![](_page_33_Picture_1.jpeg)

Transducers are used if the need for remote sensing and system control exists or when higher accuracy is required.

![](_page_33_Picture_3.jpeg)

![](_page_34_Picture_0.jpeg)

### **Industrial Pressure Transducers**

![](_page_34_Picture_2.jpeg)

# **PTI Series Features**

#### **Product Features**

Metal thin film and piezoresistive sensing technology

Stainless steel construction

Temperature compensated for accuracy under various temperature conditions

Standard and Explosion Proof models

#### **Performance Advantage**

Swagelok reliability

• Stable, repeatable, and accurate

Design flexibility

![](_page_35_Picture_10.jpeg)


## **PTI Product Features**

This diaphragm shows the strain sensitive Wheatstone bridge.

It is made from one stable metal thin film formed onto the diaphragm in the same way that micro circuits are etched onto a semiconductor wafer.





## **PTI Product Features**

#### Metal thin film and piezoresistive sensor technology



Stable, reliable, and accurate

- Long term stability  $\leq 0.2$  % of span
- Excellent repeatability to  $\leq 0.1$  % of span
- Accuracy  $\leq 0.5$  % of span
- Minimal temperature error  $\leq 0.4$  % of span per 18 °F (10 °C)
- Excellent shock resistance

## **PTI Product Advantages**



**S - Model -** General industrial applications.

Process control, laboratory & test equipment, hydraulics, and pneumatics.



**E - Model -** Specifically designed to meet the durability and performance demands of industrial applications that require explosion-proof ratings.

Well head monitoring, petrochemical, offshore oil & gas, and gas measurement.



# What are some critical transducer selection criteria?

Pressure range

- Units of measurement
- Output signal requirements
- Power supply availability
- Electrical connection requirements
- Transducer connection to pressure source
- Special requirements, options, certifications



# Transducer

I LAU

# **Questions?**



# **Swagelok® Variable Area Flowmeters**





## What is a Variable Area Flowmeter (VAF)?

A VAF is a flow measurement device that operates on the principle of allowing fluid flow to pass around a float housed in a tapered tube.

As flow force increases (normally from higher flow rates), the float moves up the tapered tube to allow for more flow area around the float.

The measured flow rate then corresponds to the location of the float within the tube.





### **VA Flowmeters**

#### **Advantages**

- 1. Visual indication of flow
- 2. Do not require any external power
- 3. Very low set-up cost
- 4. Less expensive than most flow measurement technologies
- 5. Simple and robust
- 6. Minimal pressure drop





## **VA Flowmeters**

#### **Changing Process Conditions**

 $\mathsf{G}=\mathsf{B}+\mathsf{F}$ 

- **G**: The force from gravity is a constant dependent on the mass of the float.
- B: Buoyancy of the float is dependent on the density of the liquid or gas
- F: Flow force caused by the flow rate, fluid viscosity, and annular gap within the flowmeter





## **VA Flowmeters**

#### **Changing Process Conditions**

Affects density and viscosity

- 1. Density
- 2. Viscosity
- 3. Temperature
- 4. Pressure





### **Swagelok VA Flowmeters**

We offer standard ranges for air and water applications and custom calibration for other fluids to specific applications.

For custom calibration, simply answer the six questions below for your Swagelok sales and service representative:

- 1. Fluid to be measured
- 2. Fluid viscosity with unit of measure
- 3. Fluid specific gravity
- 4. Fluid temperature with unit of measure
- 5. Fluid pressure with unit of measure
- 6. Flow measurement range with unit of measure



## **VA Flowmeters from Swagelok**

Swagelok now offers two models of VA Flowmeters:

The G Series—Glass tube flowmeters which allow direct viewing of the process fluid and direct reading of the flow, as well as excellent accuracy.





### **Swagelok G-Series**

Glass tube models

#### Six models that vary in:

- Size
- Accuracy
- Cost
- Materials of Construction





## **VA Flowmeters from Swagelok**

The M Series—Metal tube flowmeters designed for extreme operating conditions, ideal for industrial sector applications





## **Swagelok M-Series**

Metal tube or armored

Four models that vary in:

- Size
- Accuracy
- Cost
- End connections
- Orientation





**M3** 



M2

# Metal Tube – MH Model

This horizontal model offers liquid flow reading left-to-right or right-to-left to meet system requirements.

#### **Features:**

Only model available that can be mounted horizontally. Also available with ½ inch and 1 inch tube diameters.

Accuracy class = 1.6

Limit switches (min or max or both)

4 to 20 mA output signal

Has the most options available; very configurable



# **Electronic Options**

#### **Limit Switches**

- There are electronic options that are available on most models to indicate if a flow is outside of a range that a customer needs
- A sensor will pick up where the float is (above or below) and send out either a 1 mA signal for below or a 3 mA output for above
- One (min or max) or two (min and max) switches are available per flowmeter

### 4 to 20 MA Output Signal

- Is available on the M2, M3, and MH models
- Produces an analog signal that is proportional to the flow on the scale, where 4 mA is the low reading and 20 mA is the high reading





# What are some critical VAF selection criteria?

- Fluid to be measured
- Fluid viscosity
- Fluid specific gravity
- Fluid temperature
- Fluid pressure
- Flow measurement range with unit of measure
- Connection to flow source
- Special requirements, options, certifications



# **VAF Flowmeter**

# **Questions?**





Swagelok Central Ontario | Atlantic Canada

# Mechanical Temperature Measurement Products



Wetted components are 304 SS (316 SS is available)

- Process connection
- Stem tube
- Stem tip

Wetted components are welded together to prevent





- Thermal expansion of metal causes volume of the metal to change
- Bimetal systems consist of two dissimilar metals having differing expansion coefficients which are bonded together
- As temperature changes, the difference in expansion between the two metals causes a warping effect





How They Work





How They Work



Swagelok<sup>®</sup> Bimetal Thermometers are Helically Wound



The proportional movement of the bimetallic strip is
measured by a pointer
fastened to one end.
Temperature is indicated
against a calibrated dial or
scale.

• The bimetal system is helically wound and heat treated for long-term stability.

Components of a Swagelok Bimetal Thermometer



The Case Design of a Swagelok Bimetal Thermometer





Swagelok Bimetal Thermometers have Anti-parallax Dials



Swagelok Bimetal Thermometers are Field Adjustable





Swagelok Bimetal Thermometers are Field Adjustable

The hex adjustment screw should only be used when recalibrating the thermometer

- Calibration is typically in an agitated ice water bath or boiling water
- Need a calibrated thermometer with a higher accuracy rating than the thermometer being calibrated
- Adjust the screw to align the dial with the pointer



Swagelok Bimetal Thermometers have a Dampened Movement as Standard

Patented dampened movement

Silicone-free gel in the stem dampens vibration effects

Gives the benefits of a liquid-filled thermometer in a dry case

Minimizes pointer oscillation from vibration and pulsation

Extends life of thermometer

Indicated on dial





## **Bimetal Thermometer Accuracy**

Swagelok Bimetal Thermometers have a +/- 1 % Full Scale ASME B40.200 Grade A Accuracy Specification





# **Bimetal Thermometer Accuracy**

Swagelok Bimetal Thermometers have a +/- 1 % Full Scale ASME B40.200 Grade A Accuracy Specification

ASME B40.200 Grade A means that the thermometer has a plus or minus one percent linear response across the entire measuring range

For example, a Swagelok Grade A thermometer with a range of 0 °F to 250 °F (-20 °C to 120 °C) has an accuracy of +/- 2.5°F (1.4°C) anywhere along the measuring range

# **Bimetal Thermometer Configuration Options**



# Thermowells


### Thermowells

Thermowells protect the temperature measurement device from the process media

Thermowells provide pressure containment of the process fluid

Thermowells allow the temperature measuring device to be easily removed for replacement and/or service

Thermowells are available with or without lagging extensions (Lagging extensions are for use in insulated piping systems)

## Thermowells

Thermowells are available in four different process connection options

- Threaded
- ANSI-flanged (raised face)
- Weld socket
- Kwik-Clamp sanitary

There are three types of thermowell designs available

• Straight, Reduced and Tapered







## What are some critical selection criteria?

- Fluid temperature range
- Dial size
- Units of measure scale
- Stem length
- Connection to temperature source
- Special requirements, options, certifications
- Thermowell-Process connection



## Mechanical Temperature Measurement

## **Questions?**

phil.reid@swagelok.com





### **Engineering & Technical Support**



### Andrew Wright, P.Eng., MBA, Regional Field Engineer

- Years of Service with Swagelok: 10
- Regional Field Engineer since 2017
- Bachelor of Engineering degree in Materials
- Certified Welder



### Fasi Khaja, Regional Field Engineer

- Years of Service with Swagelok: 7
- Oil & Gas and Petrochemical Market Specialist
- Bachelor of Technology in Aeronautical Engineering
- Certified Swagelok Trainer

### Phil Daniels, P.Eng., Mechanical Solutions Engineer

- Years of Service with Swagelok: 5
- Swagelok Hose Advisor
- B.Sc Mechanical Engineering (focus on Thermofluids)
- Previously a Mechanical Engineer for an Alt. Fuels Dispenser



### Hassan El Ghoul, Mechanical Solutions Engineer

- Years of Service with Swagelok: 2
- Specialties include Fluid Mechanics and Regulator Essentials
- Bachelor of Engineering (Mechanical)
- Previously a Project Manager & Technical Consultant for an Alternative Energy company



### Ali Ladhani, Associate Applications Engineer

- Years of Service with Swagelok: 2
- Engineer in Training (EIT)
- Bachelor of Engineering (Nuclear Engineering)
- Custom Fluid System Assembly Project Manager, including technical review and 3D

### Swagelok

### Swage Talks

Local fluid system experts help you improve your technical knowledge and manage your nagging application issues.



A local blog to address your most critical applications.

### Welcome to Swage Talks!

The purpose of Swage Talks is to share local fluid system knowledge and solutions with you. Our team at Swagelok Central Ontario | Atlantic Canada is composed of subject matter experts who are here to provide insight and help you with your application issues. The Swage Talks blog focuses on:

- Local Support: An introduction to our team of engineers and subject matter experts who support local markets in Ontario and Atlantic Canada.
- Application Solutions: How to respond to common and nagging application issues.
- Fluid System Products & Services: Technical considerations which help you optimize system performance.

https://centralontario.swagelok.com/ en/about-us/Swage-Talks-Blog

### Swagelok

### SCO | SAC Tech Talk Webinars

### **Mechanical Seal Support Systems**

#### Session Objectives:

- Pump Overview
- Mechanical Seals
- API 682 Piping Plans
- Best Practices

Our Subject Matter Experts provide a technical overview with a Q&A throughout the session.



### **Regulator Basics**

#### Session Objectives:

- Explain the difference between a valve and regulator
- Understand regulator terminology
- · Differentiate components within a regulator
- Recognize performance attributes of a regulator

### Our Subject Matter Experts provide a technical overview with a Q&A throughout the session.



### Tube vs. Pipe

#### Session Objectives:

- · Flow, Erosion, Corrosion
- Material Quality
- Overall Cost (case study cost comparison)

Our Subject Matter Experts provide a technical overview with a Q&A throughout the session.



### **Hose Basics**

#### Session Objectives:

- · Define common hose terms and terminology.
- List hose selection variables.
- · Name guidelines for hose installation.
- State common issues found in hose applications.

Our Subject Matter Experts provide a technical overview with a Q&A throughout the session.



## Thank you for your time!

## Let us know your feedback! bit.ly/Swagelok-Webinar-Feedback



NS Technical Safety Division Power Engineering Section Examinations and Certification

> Donald Ehler Chief Inspector; Boilers and Pressure Equipment, and Power Engineering Sections

2022 Power Engineers & Plant Maintenance Education Forum



## 2022 Exams Written & Issuances

	(8	Class 1 Examinatior	ns)
	Part A Papers 1 to 4	Part B Papers 1 to 4	Total
Number of Candidates	23	19	42
Exams Attempted	22	16	38
Number Passed	15	9	24
	Numbe Certificate	4	

Class 2										
(6	(6 Examinations)									
Part A										
Papers	Papers	Total								
1 to 3	1 to 3									
53	80	133								
53	73	126								
17	42	59								
Number of	10									
Certificate	es Issued									



## 2022 Exams Written & Issuances

	(4	Class 3 Examinatior	ıs)
	Part A Papers 1 to 2	Part B papers 1 to 2	Total
Number of Candidates	103	108	211
Exams Attempted	99	100	199
Number Passed	55	72	127
	Number of Certificate	60	

Class 4 (2 Examinations)								
Part A	Part B	Total						
85	30	115						
84	74	158						
45	90							
Number of Certificate	47							



## 2022 Exams Written & Issuances

	Class 5 (1 Examination 0	Only)	F	Refrigeratior	n
Number of Candidates			16		
Exams Attempted			15		
Number Passed			9		
	Number of 5th Class Certificates Issued	0	Number of Refrig Certificates Issued		



Total

10

16

15

### 2022 Pass Rates



Nova Scotia

	1 <sup>st</sup> Class	2 <sup>nd</sup> Class	3 <sup>rd</sup> Class	4 <sup>th</sup> Class	Refrigeration
Exams Written	28	81	81	68	16
	20	01	01		10
Exams Passed	19	46	67	52	7
% Pass Rate	67.9%	56.8%	82.7%	76.5%	43.8%

274 exams written, 191 passed: 69.7% overall pass rate.

## Nova Scotia Current Trends

2022	Fi	rst Clas	S	Sec	ond Clas	SS	Th	ird Clas	S	Foi	urth Clas	S	Refrigeration			Overall		
	Exams			Exams			Exams			Exams			Exams					
	Attemped	Pass	% Pass	Attemped	Pass	% Pass	Attemped	Pass	% Pass	Attemped	Pass	% Pass	Attemped	Pass	% Pass	Exams Attemped	Pass	% Pass
Nova Scotia	28	19	68%	81	46	57%	81	67	83%	68	52	76%	16	7	44%	274	191	69.7%
Total Exams	28	19	68%	81	46	57%	81	67	83%	68	52	76%	16	7	44%	274	191	69.7%
Previous Year Total	38	24	63%	126	59	47%	199	127	64%	158	158	100%	15	9	60%	536	377	70.3%
% Change	74%	79%	107%	64%	78%	121%	41%	53%	130%	43%	33%	76%	107%	78%	73%	51%	51%	99.1%
2021	Fi	rst Clas	S	Sec	ond Clas	SS	Th	ird Clas	S	Fourth Class Refrigeration		n	Overa					
	Exams			Exams			Exams			Exams			Exams					
	Attemped	Pass	% Pass	Attemped	Pass	% Pass	Attemped	Pass	% Pass	Attemped	Pass	% Pass	Attemped	Pass	% Pass	Exams Attemped	Pass	% Pass
Nova Scotia	38	24	63%	126	59	47%	199	127	64%	158	90	57%	15	9	60%	536	309	57.6%
Total Exams	38	24	63%	126	59	47%	199	127	64%	158	90	57%	15	9	60%	536	309	57.6%
Previous Year Total	39	19	49%	100	49	49%	195	142	73%	150	82	55%	15	10	67%	499	302	60.5%
% Change	97%	126%	130%	126%	120%	96%	102%	89%	88%	105%	110%	104%	100%	90%	90%	107%	102%	95.3%



### 10 Year Trend For Nova Scotia (%) Pass Rates

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>1</b> <sup>st</sup>	54	44	43	43	48	40	50	48	49	63	68
2 <sup>nd</sup>	72	54	60	60	64	53	49	48	49	47	57
3 <sup>rd</sup>	73	73	66	66	79	73	73	79	73	64	83
4 <sup>th</sup>	68	68	61	61	82	72	66	70	55	57	76
Avg.	69	65	61	61	74	65	59	61	57	58	71



## Nova Scotia Licenses

Type Of License	<u>Standardized</u> (Last Report in 2019)/Current	<u>Provincial</u> (Last Report in 2019)/Current	<u>Pending</u> (Last Report in 2019)/Current
PE 1 <sup>st</sup> Class	130/123	31/26	116/125
PE 2 <sup>nd</sup> Class	461/443	41/30	232/268
PE 3 <sup>rd</sup> Class	649/681	41/24	277/339
PE 4 <sup>th</sup> Class	748/722	54/45	191/241
Refrigeration Class 1	Not Applicable	124/114	9/10
Refrigeration Class 2	114/142	343/282	78/72
Compressor	Not Applicable	27/26	5/1
Unfired Boiler	Not Applicable	22/21	4/2





## **Questions?**





STANDARDIZATION OF POWER ENGINEERS EXAMINATIONS COMMITTEE

FC

## **Nova Scotia**

## **Power Engineering**

### &

## **Plant Maintenance Forum**

November 16, 2022



STANDARDIZATION OF POWER ENGINEERS EXAMINATIONS COMMITTEE

SOPEEC

## What's new with

## SOPEEC



# In 2018, the Association of Chief Inspectors (ACI) approved the beginning of a 14 year process to transition the 2<sup>nd</sup> and 1<sup>st</sup> class examinations to a multiple choice format.

The examinations will be 100 multiple choice questions with a 3.5 hour time limit.



- Current implementation of long answer examinations to multiple choice to date:
  - January 1, 2020 2B3
  - January 1, 2021 **2B2**
  - January 1, 2022 2B1
  - January 1, 2023 **2A3**



- The current target is one examination paper per year.
- The examinations have been left at a 3.5 hour time limit but this is being evaluated as examinations are implemented and may change at some point in the future.



# Effective January 1, 2023 the following examinations will transition to a 100 multiple choice questions with a 3 hour time limit.

- 3<sup>rd</sup> class
- 4<sup>th</sup> class
- Standardized Refrigeration



## I apologies for not being able to attend and hope to be present next year to discuss and answer question.



STANDARDIZATION OF POWER ENGINEERS EXAMINATIONS COMMITTEE

## If you have any questions please feel free to contact me at leming@absa.ca or at 780-433-0281 ext. 3390



STANDARDIZATION OF POWER ENGINEERS EXAMINATIONS COMMITTEE

SOPEEC

## Thank you

## Tom Leming, SOPEEC Coordinator leming@absa.ca

### 780-433-0281 (ext 3390)









## What is Apprenticeship?

Apprenticeship is a post-secondary career path that will lead to certification in a skilled trade.

Apprentices complete a combination of on-the-job and technical training.

Apprentices work with certified journeypersons who pass on knowledge and skills.

The apprenticeship model is designed around the fact that most of what you need to learn will be learned on the job.



## **Sectors and Trades**

### INDUSTRIAL/MANUFACTURING TRADES

- Boat Builder
- Cabinetmaker
- Communications Technician
- Industrial Electrician
- Industrial Mechanic (Millwright)
- Instrumentation and Control Technician
- Machinist
- Metal Fabricator (Fitter)
- Mine Electrician
- Power Engineer
- Rig Technician
- Tool and Die Maker
- Welder\*

#### **SERVICE SECTOR TRADES**

- Alarm and Security Technician
- Appliance Service Technician
- Cook
- Landscape Horticulturalist
- Locksmith



#### **CONSTRUCTION TRADES**

- Carpenter
- Concrete Finisher
- Construction Craft Worker Lather (Interior Systems
- Construction Electrician
- Floorcovering Installer
- Gas Fitter
- Heavy Equipment Operato
  Plumber

- Insulator (Heat and Frost) Powerline Technician
- Ironworker (Generalist)
- Ironworker (Reinforcing)
- Ironworker (Structural/ Ornamental)
  - Mechanic)
- Mobile Crane Operator
- Painter and Decorator

- Restoration Stone Mason
- Sheet Metal Worker
- Steamfitter/Pipefitter
- Tile setter
- Tower Crane Operator

- **MOTIVE POWER TRADES**
- Agricultural Equipment Technician
- Automotive Glass Technician
- Automotive Painter
- Automotive Service Technician
- Automotive Service Technician (Service Station Mechanic)
- Heavy Duty Equipment Technician
- Marine Service Technician

- Motor Vehicle Body Repairer (Metal Paint)
- Motorcycle Mechanic
- Parts person
- Recreation Vehicle Service Technician
- Transport Trailer Technician
- Truck and Transport Mechanic

**Compulsory Trades are in Yellow** 

## **Trades In Demand**





### Bricklayer

Carpenter

Cook

**Heavy Duty Equipment Technician** 

Industrial Electrician

Industrial Mechanic (Millwright)

**Insulator (Heat and Frost)** 

Ironworker (Reinforcing)

Machinist

**Mobile Crane Operator** 

**Auto Body and Collision Technician** 

**Power Engineer/Stationary Engineer - All Classes** 

Automotive Service Technician

Truck and Transport Mechanic

## **Pathways to Apprenticeship**

### Direct Entry | On-the-job training & experience

Did you know that you can start an apprenticeship with little or no trade experience? If you can find an employer who is willing to hire and train you as an apprentice, you can start to earn money and learn the skills of your chosen career right away. There is no requirement to attend a college.

### OR

### College/Pre-employment Program | In-school training prior to apprenticeship

You do not need an employer to attend this type of training. Completing a College/preemployment program may make it easier for you to find an employer who will hire and register you as an apprentice.

If you successfully complete an approved program, you will be eligible to receive advanced standing towards your apprenticeship.



## **Apprenticeship Pathway**



## How to Become an Apprentice

**Find employment** in a designated trade with an employer who can provide a certified journeyperson to supervise you while you are working.

**Discuss** the apprenticeship program with your employer and find out if they are willing to sign an apprenticeship agreement with you.

**Register** as an apprentice! Find instructions at nsapprenticeship.ca/apprentice-registration





## What Happens Next?



Training Consultant Contact info: <u>https://www.nsapprenticeship.ca/contact#TC</u>



## **Pre-Apprenticeship Credits**

Industrial Mechanical Certificate

**Metal Fabrication** 

Oil Heat Systems Technician Certificate of Accomplishment

Pipe Trades Diploma

Plumbing Certificate

Power Engineer

Sheet Metal Worker

<u>Welding</u>

Training Consultant Contact info: <u>https://www.nsapprenticeship.ca/contact#TC</u>



To Trade Qualifier
COURSE PROGRAM NAME	DURATION	DESIGNATED TRADE	PRACTICAL HOURS	THEORY CREDIT(S)
Metal Fabrication Diploma	2 Years	Boilermaker	900	None
Metal Fabrication Diploma	2 Years	Metal Fabricator (Fitter)	1800	Level 1 & 2
Metal Fabrication Diploma	2 Years	Welder	900	Level 1

Training Consultant Contact info: <u>https://www.nsapprenticeship.ca/contact#TC</u>



To Trade Qualifier

COURSE PROGRAM NAME	DURATION	DESIGNATED TRADE	PRACTICAL HOURS	THEORY CREDIT(S)
Power Engineering Technology Diploma	2 Years	Power Engineer	4000	4rth & 3rd Class
Power Engineer NSCC - - 4rth Class – Full Time	1 Year	Power Engineer	1820 (TS) + 180 hours in the Field	4rth Class
Power EngineerNSCC - 3rd Class – Full Time	1 Year	Power Engineer	1820 (TS) + 180 hours in the Field	3 <sup>rd</sup> class

Training Consultant Contact info: <u>https://www.nsapprenticeship.ca/contact#TC</u>



To Trade Qualifier

COURSE PROGRAM NAME	DURATION	DESIGNATED TRADE	PRACTICAL HOURS	THEORY CREDIT(S)
Power Engineer Apprenticeship - 4rth Class - Online	8 Courses + 2 Mentorship Courses	Power Engineer	2000 (TS)	4 <sup>rth</sup> class
Power Engineer Apprenticeship - 3rd Class - Online	8 Courses + 2 Mentorship Courses	Power Engineer	2000 (TS)	3 <sup>rd</sup> class
Power Engineer Apprenticeship - 2nd Class – Inclass or Online	12 courses Paper A1 - A3 Paper B1 – B3	Power Engineer	4000 (TS)	2 <sup>nd</sup> class

Training Consultant Contact info: <u>https://www.nsapprenticeship.ca/contact#TC</u>



To Trade Qualifier

COURSE PROGRAM NAME	DURATION	DESIGNATED TRADE	PRACTICAL HOURS	THEORY CREDIT(S)
Sheet Metal Worker Certificate of Accomplishment	24 Weeks	Sheet Metal	720	Level 1
Sheet Metal Systems Certificate	35 Weeks	Sheet Metal	900	Level 1

Training Consultant Contact info: <u>https://www.nsapprenticeship.ca/contact#TC</u>



To Trade Qualifier

COURSE PROGRAM NAME	DURATION	DESIGNATED TRADE	PRACTICAL HOURS	THEORY CREDIT(S)
Welding Certified - Certificate of Accomplishment	22 Weeks	Boilermaker	660	None
Welding Certified - Certificate of Accomplishment	22 Weeks	Metal Fabricator (Fitter)	660	Level 1
Welding Certified - Certificate of Accomplishment	22 Weeks	Welder	660	Level 1
Welding Diploma	2 Years	Boilermaker	900	None
Welding Diploma	2 Years	Metal Fabricator (Fitter)	900	Level 1
Welding Diploma	2 Years	Welder	1800	Level 1 & 2

Training Consultant Contact info: <u>https://www.nsapprenticeship.ca/contact#TC</u>



To Trade Qualifier

COURSE PROGRAM NAME	DURATION	DESIGNATED TRADE	PRACTICAL HOURS	THEORY CREDIT(S)
Industrial Mechanical Certificate	1 Year	Industrial Mechanic (Millwright)	900	Level 1





To Trade Qualifier

COURSE PROGRAM NAME	DURATION	DESIGNATED TRADE	PRACTICAL HOURS	THEORY CREDIT(S)
Oil Heat Systems Technician Certificate of Accomplishment	20 Weeks	Oil Heat System Technician	600	Level 1

Training Consultant Contact info: <u>https://www.nsapprenticeship.ca/contact#TC</u>



To Trade Qualifier

COURSE PROGRAM NAME	DURATION	DESIGNATED TRADE	PRACTICAL HOURS	THEORY CREDIT(S)
Pipe Trades Diploma	2 Years	Plumber	1800	Level 1
Pipe Trades Diploma	2 Years	Sprinkler Fitter	900	Level 1
Pipe Trades Diploma	2 Years	Steamfitter - Pipefitter	900	Level 1

Training Consultant Contact info: <u>https://www.nsapprenticeship.ca/contact#TC</u>



To Trade Qualifier

COURSE PROGRAM NAME	DURATION	DESIGNATED TRADE	PRACTICAL HOURS	THEORY CREDIT(S)
Plumbing Certificate	1 Year	Steamfitter - Pipefitter	900	Level 1
Plumbing Certificate	1 Year	Plumber	900	Level 1

Training Consultant Contact info: <u>https://www.nsapprenticeship.ca/contact#TC</u>



To Trade Qualifier

#### **Trade Qualifier Route**

- Applies to someone who has worked many years in the trade.
- Normally requires between 8,100 and 10,800 hours of employment working with a Red Seal Journeyperson depending on the trade.
- Client does not need to complete an apprenticeship.
- Challenge the Red Seal Exam or Certification Exam by completing application and writing exam.



#### **Trade Regulations**

Industrial Mechanical

**Metal Fabricator** 

**Boiler Maker** 

<u>Oil Heat Systems</u> <u>Technician</u> Pipe Trades Diploma
<u>Plumbing</u>
<u>Steamfitter/PipeFitter</u>
Sprinkler System Installer

<u>Power Engineer</u> <u>Sheet Metal</u> <u>Welder</u> Boiler Maker



## **Apprenticeship Training**

- Offered at NSCC Campuses throughout the Province
- Intakes several times a year
- 5 10 weeks in length depending on Trade and level
- In class or online training available depending on the trade
- Currently no cost to training (books needs to be purchased by apprentice)
- Financial Supports Available



#### Training Schedule:

https://nsapprenticeship.ca/sites/default/files/ docs/pubs/Training\_Schedule-2019-20.pdf



#### **How To Apply for Training**

#### Complete a Technical Training Enrollment Form

https://novascotia.ca/lae/apprenticeship/Initia IQuestions.aspx?AppType=Online&AppForm=L AETTEF&Blaster=No



An apprentice should always talk to their employer before applying for Training!

## **Financial Incentives**

#### Support for Apprentices:

- Progression & Completion Awards

   Levels 1 & 2, CompletionCanada
   Apprenticeship Loan
- Tradesperson tools tax deduction
- El while in training
- Progression & Completion Level
   3 and non-Red Seal completion
  - PE (4rth & 3<sup>rd</sup> & 2<sup>nd</sup> classes)
- Training Supports

#### Support for Employers:

START – Apprenticeship START – Employment NS Job creation tax credit



#### **Progression Awards/ Completion Grants For Apprentices**





**Progression Awards** \$1000 when level 1 completed \$1000 when level 2 completed \$750 when level 3 completed 5400 hours + completion of level 3 training

#### **AIG Grant for Women**

(Ending March 31, 2023) For women in trades with low female representation \$3000 when female apprentice completes level 1. \$3000 when a female apprentice completes level 2.

#### **Completion Grant**

\$2000 when apprentice obtains their Red Seal Certification.

\$2000 when an apprentice obtains their provincial certification



#### Provides Monetary Incentive to Employers to Hire an Apprentice.

	Apprenticeship	Employment NS
Eligibility	Newly Registered Apprentice and be from a recognized under-represented group Or Be working for an employer in a Rural Area.	Person must be unemployed Canadian Citizen or permanent resident entitled to work in Canada and are a NS resident. International Student who meets eligibility requirements.
Incentive	<pre>\$2500 dollars when the apprentice is registered (\$5000 for a diverse client) \$5000 as each level is completed (1-4) \$2500 dollars when apprentice receives Red Seal (\$5000 for Diverse)</pre>	Up to \$25000 Dollars.
How to Apply	Application is part of the registration of the Apprentice. ITC will let employer know if they are eligible.	Application needs to be made to employment NS for both the employment and the client. Client must not have already started working for the employer.
NOVA SCOT	ΊΑ	
APPREN AGENCY	TICESHIP	

#### **Financial Supports for Training**



**EI BENEFITS** 

**EMPLOYMENT NS** 

**SUPPORTS** 

\$4,000 CANADA APPRENTICE LOAN (UP TO \$4,000 ANNUALLY)



## Contact Us!



**Call** toll free (within NS) 1-800-494-5651



Email apprenticeship@novascotia.ca Website nsapprenticeship.ca



**Drop in | Mail** office locations <u>nsapprenticeship.ca/contact/</u> <u>app-offices</u>





## Creating Inclusive Cultures through Allyship





A Presentation by: Tracy Boyer & Stephanie Gill, YWCA Halifax Shift Change

Thank you to our Funders:





 Femmes et Égalité des genres Canada

# We are meeting in Mi'kma'ki, Kjipuktuk. The ancestral and unceded territory of the Mi'kmaq peoples



## Today...

Land Acknowledgement The Project: Our Story & Learning Table Conversations Closing

## SHIFT CHANGE- ADVANCING WOMEN & EQUITY IN SKILLED TRADES

#### WHAT

#### A multi-year project that...

Seeks to improve women's economic security and prosperity by addressing barriers that impede the participation and advancement of women, in all their diversity, in the skilled trades sector.

#### WHY

The sector needs more women and people from underrepresented communities. These people would like access to the economic security skilled trades work provides.

We can help increase equity and meet some of the challenges the sector faces around skills shortages and demands to innovate.

HOW Vetworks of partners

Learning Events & Dialogue

**V** Pilots & Scaling

# The Project

#### HALIFAX Shift Change

#### TEAM

Two YWCA Halifax Staff A constellation of speciality consultants who support facilitation, innovative pilot work, knowledge translation & evaluation

# Our first Pilot...

Started with a question: Why isn't the number of Women in Trades **Increasing**?



# What do tradespeople think about that question?

# Focus Groups

- 71 male supervisors from 20+ companies
- 5 focus groups
- Strong turnout from a range of sectors (construction, industrial, manufacturing)
- Participants spoke freely
- Positive feedback on value of the sessions and a desire for more of these opportunities



Themes from the Focus Groups

- More women in the workplace is a difficult adjustment for men. There is fear of repercussions.
- Men feel undervalued.
  - Struggles that are most "acute" are around sexual harassment, sexuality in the workplace and language.
- It's difficult to be a champion for this change.
- Individuals need time and space to be self-reflective as to their own role in creating the conditions of a better workplace culture.

A Gender Inclusive Leadership Course for Male Supervisors

#### Purpose

 Prepare male supervisors in the trades with the skills and knowledge to support inclusive and safe workplaces for all genders.

#### Components

- 6 in-person learning modules
- Weekly homework assignments & action learning

#### To complete certificate

- Active participation in class
- Completion of homework assignments

A Gender Inclusive Leadership Course for Male Supervisors

#### **Supervisors learn about:**

Module 1: Understanding gender in the workplace Module 2: Gender awareness Module 3: Power and Gender Module 4: Communication & Gender-based violence Module 5: Conflict resolution Module 6: Leadership & fostering welcoming and inclusive worksites

## The Impact...in their words...

"It was eye opening, some of the things we talked about I would not think about or realize happens."

"How much extra work they have to put in to be recognized."

"Woman just want to be treated the same and be heard and validated." "Open conversation at the ground level, it can be a difficult conversation to have, but attempting to make it a safe space for people to discuss this matter is the first step to improving the environment."

"I was happy to hear how well women can do in trades with good role models but it was shocking how much non work relate hard ships they had to deal with." "Being more engaged in conversation. Speaking up in situations I may have just walked away from if I was uncomfortable. I feel like I am much more prepared to have an uncomfortable conversation with others to help promote a positive workplace culture."

"It was probably one of the most effective courses I have been on. Most likely because I reflected on myself more than anything. The way it was delivered was good and effective as I felt it was designed to be personal."

## What being an Ally looks like...



## Table Conversations

#### **Question:**

Where have you seen allyship happen in your life and work?

## Sticky Note Time!

#### **Question:**

Write down one thing you want to learn about to be a better ally to women in all their identities?

# Systems Change







#### The 3-Step Framework and more!

A CCWESTT PROJECT



#### www.WeAreTrades.ca





"In our ideal world, the employer would seek these things out [proper equipment], without us going and asking."

- Tradeswoman





These maps are fluid and ever changing and should be used as an education tool to create dialogue around reconciliation.




## **#CHAMPIONS4CHANGE**

Join us and promote change for women working in the skilled trades

https://switcanada.caf-fca.org/

#### Table 2: Total apprentices by sector and 2021-2022 gender representation

Total Apprentices by Sector	2017- 2018	2018- 2019	2019- 2020	2020- 2021	2021- 2022	One Year Change	Female 2021- 2022	Male 2021- 2022
Construction Sector	4036	4140	4303	4271	4473	4.73%	268	4205
Motive Power Sector	1238	1337	1468	1473	1510	2.51%	89	1421
Industrial Manufacturing Sector	1064	1116	1164	1046	1093	4.49%	126	967
Service Sector	206	295	319	268	275	2.61%	131	144
TOTAL	6611	6888	7254	7058	7351	4.15%	614	6737

Trade	2017- 2018	2018- 2019	2019- 2020	2020- 2021	2021- 2022	One Year Change 2020-2021 to 2021- 2022	Female 2021- 2022	Male 2021- 2022
Power Engineer	178	194	191	91	98	7.69%	8	90
Power Engineer (Plant Operator)	22	33	49	44	51	15.91%	1	50





## Diversity and Inclusion Feedback



Sarah Lumsden From Feedback on Day 1 of the Education Forum





## What came up?

#### What is it like for women?

Why are there not more women now?

Making a welcoming workplace

Growing your awareness

Learning goals

Honest questions

# What is is like for women?

What are the biggest concerns they have working in our industry

Past work experiences

What does it feel like to work in a male dominated trade

What they expect from male coworkers

Fears women have from moving into male dominated industries

How do you feel in a male dominant role, do you feel intimidated being in a male dominated field

I would like to learn about how difficult it is to work in a male work force

What is the biggest barrier facing women when things about going into trades





# Why are there not more women now?

Their reservations to why they don't attend trade programs in better numbers

What entry barriers exist for work in trades or engineering?

Are women applying to trades and leaving after abuse or are they not applying at all? Are they not applying out of fear? Or is it a personal choice? Gender preference?

Their reservations to why they don't attend trade programs in better numbers

What entry barriers exist for work in trades or engineering?



# Making a welcoming workplace

How can I create a place that is more welcoming

How can I help change move faster

What motivated them and made them feel strong, how can I help

What is one of the things or statements I make that make you feel like less as a worker or employee

I want to better understand the bias's they face day to day to help me self-recognize my own unconscious bias's

How to make them feel more comfortable in the workplace

What do we need to do to upgrade our facility to make it more comfortable

Conference presentation



#### I want to understand the binary identities more



Pronoun experience





I want to learn how to be a better ally to the lgbtqia2s+

#### Learning Goals

Acceptance in the work force

How to better support and inspire other women

Find compassion

How to be fully inclusive

I want to be more open to change

Treat the others how you want to be treated

Understand other points of view

How to communicate

I want to learn how to better start the conversation to be an ally

Listen and understand their perspectives and challenges they face

# Honest questions

#### Are women as mechanically curious as men?

#### 2

I want to learn how to take it back after I spit out something stupid

#### 3

What is the most challenging thing you need to overcome to work in a power plant



Sarah Lumsden

IPE/DND

Lumsden.sarah1@gmail.com



### **NSCC Programming Update** Plant Engineers & Plant Maintenance Education Forum 2022

Don Jardine, P. Eng. Academic Chair, NSCC School of Technology & Environment Akerley Campus

Date: 2022-11-16



## Nova Scotia. We're all over that.



## 140+

## Programs

#### Explore your interest.

- Academic Upgrading and Skills Development
- Building and Manufacturing
- Business
- Creative Industries
- Culinary and Tourism

- Engineering Technologies
   Environment, Sustainability and Natural Resources
- Health and Wellness
- IT and Data Analytics
- Language and Cultural Studies

Marine
Social and Community Supports
Surveying, Mapping and Geomatics

Transportation





#### **NSCC QUICK FACTS**

82% 26

of graduates are employed\*

average age of NSCC students

94% 55%

of employed NSCC graduates live and work in Nova Scotia\*

55% of incoming students have previous post-secondary experience\*\*

\*NSCC 2020 Graduate Survey \*\*NSCC 2020 Fall Student Success Survey

## **Sydney Waterfront Campus**

- 305,000 SF on Sydney Waterfront
- Design accounting for 100 year forecasted sea level rise
- Geothermal heating and cooling
- Infrastructure for rooftop solar panels (Net Zero performance planning)
- eV charging stations



## Sydney Waterfront Campus Rendering





## **Sydney Waterfront Campus Rendering**





## **Sydney Waterfront Campus**





## **Power Engineering Technology**



## **Pre-employment Program**

- Power Engineering Year 1 Advising Map '22-'23.pdf
- Power Engineering Year 2 Advising Map '22-'23.pdf
- Year 1 includes preparation (Courses and Plant Hours) to write DoL Class 4 exams
- Class 4 license required to start Year 2
- Year 2 includes preparation (Courses and Plant Hours) to write DoL Class 3 exams
- Credit of 2000 hours/year



## Enrolment 2018 - 2022

Fall Milestone Enrolment - Power Engineering Technology - by Campus*					
Milestone Academic Term		Year o			
	Campus	Incoming	Returning	Total	
Fall 2018	Akerley	20	19	39	
	Marconi	17	0	17	
	Strait Area	31	27	58	
Fall 2018 Total		68	46	114	
	Akerley	19	17	36	
Fall 2019	Marconi	24	6	30	
	Strait Area	24	14	38	
Fall 2019 Total		67	37	104	
	Akerley	21	15	36	
Fall 2020	Marconi	18	13	31	
	Strait Area	23	13	36	
Fall 2020 Total		62	41	103	
	Akerley	erley 18 11	11	29	
Fall 2021	Marconi	13	11	24	
	Strait Area	14	17	31	
Fall 2021 Total		45	39	84	
	Akerley	18	11	29	
Fall 2022	Marconi	0	12	12	
	Strait Area	10	10	20	
Fall 2022 Total		28	33	61	
Grand Total		270	196	466	





## **Apprenticeship Delivery**

- Delivery pattern: 2-A1, 2-A2, 2-A3 3-week Blocks each separated by 1 week off
- Delivery pattern: 2-B1, 2-B2, 2-B3 3-week Blocks each separated by 1 week off
- Intensive 3 weeks
- Pre-course preparation
- Feedback: timing, preparation improvements, other ...



Nova Scotia Labour, Skills and Immigration (LSI) Immigration and Population Growth Branch

Nova Scotia Power Engineers & Plant Maintenance Education Forum

November 16, 2022





## NOVA SCOTIA CANADA

International Attraction Interprovincial Migration International Student Retention 5-things you can do today to attract and retain talent!



#### Immigration to Nova Scotia

Federal and provincial governments share jurisdiction

#### Provincial government (Nova Scotia)

nominates and endorses candidates who contribute to the labour market and economy in the province

#### Federal government (Canada) Final entry into Canada Visas (work, study, etc.) Immigrate to Canada (PR)

No application fees to the Nova Scotia Nominee Program (NSNP) or Atlantic Immigration Program (AIP), but there are fees for other parts of the process















#### Domestic Marketing Campaign: Live in Nova Scotia

Building on success of 2021-22 Domestic Campaign

Launching October 17, running Fall through Winter 2022-23

Targeting job seekers 25-40 in key markets (Ontario and Alberta) of Nova Scotia's skilled trades careers

Raise awareness that Nova Scotia is hiring

Leveraging More Opportunity for Skilled Trades (MOST) program

Directing job seekers to liveinnovascotia.com



Recruitment and Retention: 5 things your business can do



Apply to be a designated employer with the Atlantic Immigration Program (AIP) at novascotiaimmigration.com



Advertise your job vacancies using platforms that are tailored to your specific audience



Create a welcoming environment in your workplace through employer training, educating staff on customs and traditions, etc



Be flexible and open to change by recognizing that new people bring new and fresh ideas and diversified skillsets



Look at your community through the lens of a newcomer and be mindful of the assets of the community as well as the gaps



novascotiaimmigration.com immigration@novascotia.ca







in the second second



## Refrigeration Systems CSA B52 and Regulations

#### Jamie Swindells, P.E. Technical Safety BPE Inspector Specialist III, IS, AI





## So, what happens when an Inspector arrives at your refrigeration plant?

#### What are they looking at and why?



There are two regulations that we enforce, under the Technical Safety Act:

- Power Engineering Regulations
- Boiler and Pressure Equipment Regulations

For refrigeration code requirements an Inspector refers to CSA B-52



## We follow a checklist that allows us to ensure items are in compliance

CSA B52-13 Requirements	Equipped	Insufficient
Plant Signage 5.11		
Posting of Instructions 5.11.5		
Explosion Protection 6.2.4		
Ventilation 6.2.5.5.2		
Fan Switches installed Inside /outside 6.2.5.4		
Class T - CSA B52		
No Flame producing Devices installed in Machinery RM 6.3 (a)		
Exit Door to Outside 6.3 ( b)		
Vestibule if required 6.3(b)		
Tight Construction, no holes where piping or electrical exits room 6.3 (c)		
Room of Non Combustible construction 6.3 (d)		
Kill switch located in accessible location outside Mech RM 6.3 (h)		
Fan switch located in accessible location outside Mech. RM 6.3 (i))		
Mech Ventilation system activated on gas detector activation 6.3 (i)		
Alarm system activated at TLV of the detector system 6.3 (i)		
Oil Pot Drains- Spring Loaded or Man Down Valve installed (Recommendation)		



#### Plant Signage B-52 5.11

#### 5.11.1 Signs (all systems)

Each refrigeration system shall be provided with a permanent sign that is securely attached, readily accessible, and legible, and that indicates the following: name and address of installer; refrigerant type; lubricant type and amount; total weight of refrigerant required for normal operation;

field test pressures applied;

refrigeration capacity at design or nominal conditions; and

for prime mover(s), the rating in kilowatts (hp) or full-load current and voltage.

#### Power Engineering Regulations also state:

An owner of a regulated plant must equip any tripping device required by Sections 23 to 26 with a manual reset that is secured and prevents access by any person other than a power engineer or plant operator.



#### So will this sign prevent access and secure the Equipment?




### Plant Signage B-52 6.2 Ventilation

#### 6.2.5.3 Location of air inlets and the provision of makeup air

The air inlets to the exhaust ventilation system shall be located near the machinery, suitably guarded, and at an elevation where refrigerant from a leak is most likely to concentrate. Provision shall be made for outdoor makeup air to replace that being exhausted. Openings for makeup air shall be positioned to avoid intake of discharge air. The air shall be discharged to the outdoors in a manner that does not cause inconvenience or danger. The air supply for and exhaust ducts to a machinery room shall serve no other area.

#### 6.2.5.4 Fan switches

Readily accessible independent fan switches shall be installed inside and outside the machinery room. Fan switches located outside the machinery room shall be capable of starting but not stopping the ventilation.

### Under "T" Class Machinery Rooms

(i) An independent mechanical ventilation system shall be provided as specified in Clause 6.2.5.5. In basements, the ventilation system shall be operated continuously. All locations shall be equipped with a vapour detector that shall automatically start the ventilation system and actuate an alarm at the lowest practical detection levels not exceeding the concentration limits specified in Item (c)(iii) of Clause 4.5.2 or 300 ppm for ammonia. The vapour detector shall also initiate a supervised alarm so that corrective action can be initiated.



#### What is a "T" Class Machinery Room?

Determine refrigerant classification (see Clause 4.4)

### Table 1Refrigerant classifications and quantities

(See Clauses 4.3.2, 4.4.1, 4.5.2, and 4.6.2.)

			Quantity of refrigerant per occupied space*							
Refrigera number	nt	Chemical formula	kg/m <sup>3</sup> †	1b/10 Vol. % ft <sup>3</sup> †	000 Limited by‡	TLV <sup>®</sup> / TWA§				
Group A2	L, Blends									
R-452B	R-32/125/1234yf (67/7/26)	0.078	3.0	4.6	LFL	870				
R-454C	R-32/1234yf (21.5/78.5)	0.46	1.9	29	LFL	620				
R-455A	R-744/32/1234yf (3.0/21.5/75.5)	0.38	3.0	23	LFL	650				
R-457A	R-32/1234yf/ 152a (18.0/70.0/ 12.0)	0.4	1.5	25	LFL	650				
Group B2										
R-717	Ammonia	NH <sub>3</sub> 0	.00035 (	0.05 0.022	IDLH	25				



### Table 2System application requirements

(See Clauses 4.3.2, 4.5.1, and 4.5.2 and Figure 1.)

		Occupancy			
Refrigerant group	System leakage probability	Institutional	Public assembly/ Residential	Commercial	Industrial
A1	High	(b)	(a)	(a)	(c), (d)
	Low	(e)	(e)	(e)	(e)
A2	High	(f)	(f)	(f)	(c), (d)
	Low	(h)	(h)	(h)	(h)
A3	High	(j)	())	(j)	(c), (d)
	Low	(j)	(j)	(j)	(h)
B1	High	(b), (g)	(a), (g)	(a), (g)	(c), (d)
	Low	(e)	(e)	(e)	(e)
B2	High	(f) (q)	(f) (g)	(f) $(g)$	(c) (d)
B3	High	(j)	(j)	(j)	(c), (d)
	Low	(j)	(j)	(j)	(h)
Note: The lette	ers in parentheses corre	espond to the list ite	m designations in Clause	2 4.5.2.	



### What is "h"

### 4.5.2 System application rules

**Note:** The list item designations in this Clause correspond to the letters in parentheses in Table 2.

- (h) When the quantity of refrigerant in a system exceeds Table 3 amounts, all refrigerant-containing parts, except piping and those parts outside the building, shall be installed in a machinery room constructed in accordance with Clause 6.3. The following limitations on refrigerant quantities shall apply:
  - (i) institutional: 250 kg (550 lb);
  - (ii) public assembly: no limit, except as outlined in Item (i);
  - (iii) residential: no limit, except as outlined in Item (i);
  - (iv) commercial: no limit, except as outlined in Item (i); and
  - (v) industrial: no limit, except as outlined in Item (i).
- (i) When the quantity of refrigerant in a system exceeds Table 1 amounts, all refrigerant-containing parts, except piping, low-side components, condensers, and parts outside the building, shall be installed in a machinery room constructed in accordance with Clause 6.2.

In addition, refrigerants in Groups A2, A3, B2, and B3 shall meet the following requirements:

- (i) The special machinery room requirements of Clause 6.3 shall apply.
- (ii) Except for ammonia systems, refrigerant amounts exceeding 500 kg (1100 lb) shall be approved by the authority having jurisdiction.



#### 6.3 Class T machinery rooms

In cases specified in Clause 4.5.2, a machinery room shall meet the following special requirements in addition to those specified in Clause 6.2:

- (a) There shall be no flame-producing device or hot surface over 427 °C (800°F) permanently installed in the room.
- (b) The room shall have at least one exit door that opens directly to the outer air. Other exits communicating with the building shall be permitted, but shall be through a vestibule equipped with approved self-closing, tight-fitting fire doors.
- (c) The machinery room envelope, including any vestibule, shall be of tight construction.
- (d) The machinery room envelope, including any vestibule, shall have not less than one-hour fire-resistive construction as defined by the *National Building Code of Canada*.
- (e) Exterior openings, if present, shall not be under any fire escape or any open stairway.
- (f) All pipes piercing the interior walls, ceiling, or floor of a Class T machinery room shall be tightly sealed to the walls, ceiling, or floor through which they pass.
- (g) Air ducts passing through a Class T machinery room shall be of tight construction and shall have no openings in such rooms.
- (h) Remote pilot control of the mechanical equipment in the machinery room shall be located immediately outside the machinery room and shall be provided solely for shutting down the equipment in an emergency. Ventilation fans shall have a control switch on a separate circuit located immediately outside of the machinery room, and shall be permitted to run as long as power is available.

Ew (

An independent mechanical ventilation system shall be provided as specified in Clause 6.2.5.5. In basements, the ventilation system shall be operated continuously. All locations shall be equipped with a vapour detector that shall automatically start the ventilation system and actuate an alarm at the lowest practical detection levels not exceeding the concentration limits specified in Item (c)(iii) of Clause 4.5.2 or 300 ppm for ammonia. The vapour detector shall also initiate a supervised alarm so that corrective action can be initiated.



When refrigerants of Groups A2, A3, B2 other than ammonia, and B3 are used, the machinery room shall conform to the requirements for Class 1, Zone 2 locations as defined in the *Canadian Electrical Code, Part I*.



Ļ	Guarded Plant Requirements (Power Engineer Regulations)
5	High Liquid Level Tripping Device 25 (1) (a)
5	A high-temperature tripping device, 25 (1) (b)
,	A high-discharge-pressure trip 25 (1) (c)
3	A low-oil-pressure tripping device 25 (1) (d)
)	Refrigerant Vapour Detector 25 (2)
	A maintenance schedule for the control, alarm and safety
)	devices and systems and the guarded controls 21.1
	Alarm and safety devices , tested and calibrated 21.2
2	Date Controls tested:
	An extended alarm system that is capable of initiating
3	an alarm to a monitoring system 21.1 (a)
Ļ	Tripping devices equipped with Manual Reset 21.3



### What Classification is your plant?

Refrigeration plants:									
First Class	refrigeration plant that uses a Group A1 or B1 refrigerant	over 1000 kW							
	refrigeration plant that uses a Group A2, A3, B2, or B3 refrigerant	over 450 kW							
Second Class	refrigeration plant that uses a Group A1 or B1 refrigerant	1000 kW or lower							
	refrigeration plant that uses a Group A2, A3, B2, or B3 refrigerant	450 kW or lower							



#### What is the level of Supervision?

- **15 (1)** An owner of a regulated plant must provide continuous supervision of the plant unless the PE chief inspector authorizes reduced supervision under Section 16.
  - (2) An owner or person in charge of a regulated plant, other than a regulated plant that is authorized under Section 16 to operate as an unsupervised plant, must not operate the plant or permit the plant to be operated unless it is operated in accordance with all of the following:
    - (a) it is operated under the supervision of a power engineer or a plant operator who holds a class of PE licence that qualifies them to act as the chief power engineer or chief plant operator of the plant;
    - (b) it is operated under the level of supervision authorized under these regulations for the regulated plant and in accordance with the requirements for the level of supervision.



What is reduced supervision?

- **16 (1)** An owner of a regulated plant may apply to the PE chief inspector for authorization to operate the plant under less than continuous supervision and operate the plant at 1 of the following reduced levels of supervision:
  - (a) periodic supervision; Checks every 12 hours
  - (b) minimum supervision; Checks every 24 hours
  - (c) unsupervised.



What are some conditions that changes the supervision back to continuous supervision?

#### Loss of reduced supervision status

- **17 (1)** An owner of a regulated plant that is authorized to operate at a reduced level of supervision under Section 16 must immediately change the level of supervision for the plant to continuous supervision if any of the following occurs:
  - (a) the extended alarm system or one of the required control, alarm and safety devices and systems is inoperative or ineffective;
  - (b) the plant no longer meets the conditions in subsection 16(4);



# What are some of the checks the Engineer / Operator should make?

- (2) A power engineer or plant operator of a regulated plant that is operating under periodic supervision must not leave the plant site without ensuring all of the following:
  - (a) that the plant is operating under automatic control safely and in accordance with the manufacturer's specifications;
  - (b) that the plant is guarded;
  - (c) that any building containing or serviced by the plant is unoccupied.



What is "Guarded" ?

#### Maintenance schedule and testing

- **21 (1)** An owner, chief power engineer or chief plant operator of a regulated plant that is required to be guarded must establish a maintenance schedule for the control, alarm and safety devices and systems and the guarded controls required by Sections 22 to 26 and must maintain them in accordance with the maintenance schedule.
  - (2) An owner, chief power engineer or chief plant operator of a regulated plant that is required to be guarded must test and calibrate, in accordance with the manufacturer's specifications, the control, alarm and safety devices and systems and the guarded controls required by Sections 22 to 26.



- **22 (1)** An owner of a regulated plant that is operated under conditions that require it to be guarded under these regulations must equip the plant with all of the following:
- W
- (a) an extended alarm system that is capable of initiating an alarm to a monitoring system in a location that is continuously attended when the plant is operating under guarded conditions;
- (b) an automatic control system that safely operates the plant when the power engineer or plant operator in charge stops manually operating the controls.



An owner of a regulated plant must ensure that when an alarm signal is initiated by an extended alarm system at a guarded plant, the power engineer or plant operator responsible for the plant is immediately notified by the person monitoring the system.



An owner of a regulated plant must equip any tripping device required by Sections 23 to 26 with a manual reset that is secured and prevents access by any person other than a power engineer or plant operator.



### Extended Alarm System

(2) An owner of a regulated plant must ensure that when an alarm signal is initiated by an extended alarm system at a guarded plant, the power engineer or plant operator responsible for the plant is immediately notified by the person monitoring the system.

#### Loss of reduced supervision status

- **17 (1)** An owner of a regulated plant that is authorized to operate at a reduced level of supervision under Section 16 must immediately change the level of supervision for the plant to continuous supervision if any of the following occurs:
  - 2 Ma
    - (a) the extended alarm system or one of the required control, alarm and safety devices and systems is inoperative or ineffective;
    - (b) the plant no longer meets the conditions in subsection 16(4);



### Checklist – Power Engineering Regulations

Ļ	Guarded Plant Requirements (Power Engineer Regulations)
5	High Liquid Level Tripping Device 25 (1) (a)
5	A high-temperature tripping device, 25 (1) (b)
,	A high-discharge-pressure trip 25 (1) (c)
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)	Refrigerant Vapour Detector 25 (2)
	A maintenance schedule for the control, alarm and safety
)	devices and systems and the guarded controls 21.1
	Alarm and safety devices , tested and calibrated 21.2
2	Date Controls tested:
	An extended alarm system that is capable of initiating
;	an alarm to a monitoring system 21.1 (a)
Ļ	Tripping devices equipped with Manual Reset 21.3



### Questions ???



## **Commercial Solar**

November 2022



Enjoy the good things efficiency brings.

## **Growth of Solar**

1200 1000 800 600 400 200 0 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020

Nova Scotia

150,000 125,000 100,000 50,000 25,000

2010 2011 2012 2013 2014

0

Global

2015

2016

2017

2018 2019

efficiency"

150.000 .....

### **Solar Irradiance**





<950

1400

Units (kWh/kW/yr)

energyhub.org

Canada Average: 1133kWh/kW/yr

# **Net Metering**





# **Option Comparison Matrix**

	Capital Cost	Financial Savings	Complexity	Network Reliance
Net Metering	Low	Lower	Low	High
Behind Meter + Storage	High	High Potential	Medium	Low/Medium
Behind Meter No Storage	Medium	Medium	High	Medium



# **Financial Analysis Comparison**

		The	Financial Ca	se	For Thi	is Oppor	tuni	ty		
Electric Savings:	110,000 k	Wh/Yr	Electric Rate:	\$	0.0900	/ kWh	=	Savings:	\$ 9,900	/ Yr
Non-Elec Savings:	G	J/Yr	Non-Electric Rate:	\$		/ GJ	=	Savings:	\$	/ Yr
						N	on-Ene	ergy Savings:	\$	/ Yr
						Total Annua	l Finan	cial Savings:	\$ 9,900	/ Yr
Project Cost:	\$ 235,000		less Incentive:	\$	11,000		=	Net Cost:	\$ 224,000	
Discount Rate:	0.00%		Project Life:		20	Yrs	=	NPV:	\$ -26,000	
								IRR:	-1.15%	
Finance Rate:			Reinvestment Rate:				=	MIRR:		
								SIR:	-0.12	:1
								ROI:	-11.6%	
								PBP:	22.6	Yrs
								PBP:	271.5	Mths
			Your Sav	ving	gs Sim	plified				
	Est. Net Profit Marg	gin:	8.50%		=	Savings as E	quivale	ent Revenue:	\$ 116,471	/ Yr
Revenu	le per Production Me	tric \$			=	Savings as	Jnits o	f Production:		/ Yr
Your Emissions Reductions										
Elec	ctric Emissions Intens	ity:	630.90 g/	kWh	=	Ele	ctric G	HG Savings:	69,399	kg/Yr
Non-Elec	ctric Emissions Intens	ity:	56.10 kg	/GJ	=	Non-Ele	ctric G	HG Savings:		kg/Yr

	The	Financial Cas	e For Th	nis Oppor	tunity		
Electric Savings:	110,000 kWh/Yr	Electric Rate: \$	0.1400	/ kWh	= Savings:	\$ 15,400	/ Yr
Non-Elec Savings:	GJ/Yr	Non-Electric Rate: \$	;	/ GJ	= Savings:	\$	/ Yr
				N	on-Energy Savings:	\$	/ Yr
				Total Annua	l Financial Savings:	\$ 15,400	/ Yr
Project Cost: \$	235,000	less Incentive: \$	; 11,000		= Net Cost:	\$ 224,000	
Discount Rate:	0.00%	Project Life:	20	Yrs	= NPV:	\$ 84,000	
					IRR:	3.25%	
Finance Rate:		Reinvestment Rate:			= MIRR:		
					SIR:	0.38	đ
					ROI:	37.5%	
					PBP:	14.5	Yrs
					PBP:	174.5	Mths
		Your Savi	ngs Sim	plified			
E	Est. Net Profit Margin:	8.50%	=	Savings as E	quivalent Revenue:	\$ 181,176	/ Yr
Revenue p	per Production Metric \$		=	Savings as	Units of Production:		/ Yr
Your Emissions Reductions							
Electric	c Emissions Intensity:	630.90 g/k\	Wh =	Ele	ectric GHG Savings:	69,399	kg/Yr
Non-Electric	c Emissions Intensity:	56.10 kg/0	GJ =	Non-Ele	ectric GHG Savings:		kg/Yr



## Assistance

- Efficiency NS: \$0.10/kWh PBP must be <15yr
- New: 30% Federal tax credit for both commercial solar and energy storage projects
- Accelerated Capital Cost Allowance





# **Net Metering Changes**

	Early 2022	Mid 2022	Now
1Ph	30kW Cap	27kW Cap	27kW Cap
3Ph (Demand Tariff)	100kW Cap	No Offering	Usage up to 1MW
3Ph (Consumption Only Tariff)	100kW Cap	No Offering	Usage up to 200kW



## **Current Regulatory Position**

- DNRR: New Program for Commercial Net Metering
- NSPI has until November 22 to present new program to the UARB





## **Impact of Amendments:**

- Set specific duties and responsibilities for Nova Scotia Power to run the program
- Allow Nova Scotia Power to count energy generated from net metering toward its renewable electricity standard target
- Prevent Nova Scotia Power from imposing additional system access charges





### Compressed Air Leak Auditing November 2022



Enjoy the good things efficiency brings.

## **The Most Expensive Utility**







## **Cost Contribution**





## **ENS CA Leak Audit Program**

- Complimentary service conducted by ENS
- Air leaks detected, documented, and tagged
- Report: Leak locations and associated costs
- Follow-up survey, report, and incentive of 5c/kWh
- Ultrasonic equipment and training available to conduct survey in-house





### **Ultrasonic Leak Detection**







# 2022 Program Performance

- 18 Facilities surveyed
- Total annual savings 2,213,056kWh (\$199,175) (1,396t)
- Average annual savings: 122,948kWh (\$11,065) (77.6t)







Don't Forget!

Come to our table to see our leak audit equipment, and to enter your name for the gift basket draw!





Lockout and Tag The regulatory perspective

#### Presentation by:

Don Hartt, Occupational Health & Safety

Safety Branch, Nova Scotia Department of Labour, Skills and Immigration November 17, 2022

1-800-9LABOUR "Make the Right Call"



### The Role of the Safety Branch

- The Safety Branch concentrates effort on safe and healthy workplaces, work practices, and safety standards protecting the general public and property.
- > Who is the Safety Branch
  - > Occupational Health and Safety
  - Technical Safety
  - Strategic Planning and Accountability





### **OHS Regulatory Context**

Hierarchy of Laws

- •Acts: Policy, general in nature
  - Legislature
- •Regulations: more specific
  - Cabinet
- Codes of Practice detailed
  - Director
  - Not covered by existing regulation
- Guidance Documents


#### The OH&S Act

- Internal Responsibility System (IRS) 2
- Key Definitions 3
- Duties and Responsibilities 13-23
- OHS Policies & Programs 27-28

- Employee rights 42-43, 46
- Complaints and Discriminatory Action 45-46
- Appeals 67-70 and Deviations 73
- Enforcement 71-81 and Penalties 84



#### Internal Responsibility System

- Foundation Principle (s.2)
  - Shared Responsibilities
  - Primary Responsibility
  - Framework
  - OH&S Division's Role



## Internal Responsibility System

All parties share responsibility:

a)Employers

b)Contractors

c)Constructors

d)Employees

e)Self-employed

f)Suppliers

g)Owners

h)Engineers

i)Architects

j)OHS consultants



Employer Contractor Constructor Owner "employer" means a person who employs one or more employees or contracts for the services of one or more employees, and includes a constructor, contractor or subcontractor

Every ...... shall take every precaution that is reasonable in the circumstances to ensure the health and safety of persons at or near the workplace

From Occupational Health and Safety Act, Duties and Precautions



#### **Suppliers**

#### Providers of Service

ensure that any device, equipment, machine, material or thing supplied by the supplier is in safe condition, and in compliance with this Act and the regulations when it is supplied

ensure that no person at a workplace is endangered as a result of the provider's activity

From Occupational Health and Safety Act, Duties and Precautions



#### Engineers

(+architects)

a professional engineer ... who gives advice or stamps documents shall take every precaution that is reasonable in the circumstances to ensure that a person who is likely to rely on the advice, seal or stamp **will not be in contravention of this Act or the regulations** as a result of such reliance

a professional engineer ... who gives advice or stamps documents, **negligently or incompetently** and **a person at a workplace is endangered thereby**, the ... professional engineer contravenes this Act

From Occupational Health and Safety Act, Section 21 Precautions to be taken by architects and engineers



## Competent person

a person who is

(i) **qualified** because of their <u>knowledge</u>, <u>training</u> and <u>experience</u> to do the assigned work in a manner that ensures the health and safety of every person in the workplace, and

(ii) **knowledgeable** about the provisions of the **Act and regulations** that apply to the assigned work, and about **potential or actual danger to health or safety** associated with the assigned work,

From Occupational Safety General Regulations, Section 2 Definition of "competent person"



## LOTO / Hazardous Energy

What are the requirements in Nova Scotia?

Occupational Safety General Regulations made under Section 82 of the *Occupational Health and Safety Act* S.N.S. 1996, c. 7 O.I.C. 1999-195 (effective Apr 28, 1999), N.S. Reg. 44/1999 amended to O.I.C. 2013-65 (effective June 12, 2013), N.S. Reg. 53/2013

Occupational General Safety Regulations (OSGRs) Part 6, Sections 51 - 54

This Part applies to a machine, equipment, tool or electrical installation that is erected, installed, assembled, started, operated, handled, stored, stopped, inspected, serviced, tested, cleaned, adjusted, maintained, repaired or dismantled



Section 51 OSGRs

- •Key definitions
  - "equipment" includes pipes for transporting a material, and hydraulic or pneumatic lines
  - "lock-out device" means the device that secures the isolation of the energy source ...
  - "lock-out tag" means a tag that (i) is installed at a lock-out location, (ii) has words directing a person not to start or operate ..., (iii) identifies the person who has performed a lock-out, and (iv) does not readily conduct electricity
  - "zero energy state" means a condition that ensures things are incapable of spontaneous or unexpected action or otherwise releasing kinetic or potential energy



#### Section 52 OSGRs – Outlines requirements for procedure

•Where work is performed on a machine, equipment, tool or electrical installation, and the work is hazardous to a person because its energized, an employer shall ensure that

- The work is done in accordance with a written lock-out procedure established by the <u>employer</u>
- No work is completed until its in zero energy state, its locked out, and has a lock-out tag at each location
- A competent person verifies and tests to determine there is a zero energy state

•No work can happen until these requirements are met.



What's a written lock-out procedure?

Section 52(2) OSGRs

- Provision for complying with the requirements in previous slide;
- Communication elements Notification to others that the area is safe for work after a lock-out has been completed;
- Method of determining that all persons near the locked out locations have been instructed to remain clear before things are re-energized
- the method of **energizing** the machine, equipment, tool or electrical installation.



Implementing a LOTO procedure

Section 53 OSGRs

•Only the person who installed a tag or device can remove it

However, if there is a serious emergency

A person knowledgeable has determined its safe to energize can remove; OR
A competent person designated in procedure (i.e. backup) and has determined its safe to energize can remove



Flexibility – What if you can't lock out Section 54 OSGRs

Despite requirement to have procedure where measures are **inappropriate**, **inadequate**, OR not **reasonably practicable** 

Then,

An employer may **substitute** for the requirements for an alternative adequate written procedure that specifies **responsibilities**, **training** and **equipment requirements** and the **tasks** in a manner that will ensure the safety of all person who may be exposed.



Flexibility - Deviations

Section 83 of the Occupational Health and Safety Act provides applicant **requirements for application submissions** and **sets the standard** to be met for the Director to be able to **authorize** a deviation.

A deviation enables a reasoned substitution that delivers, at **least, equivalent safety as compared to the regulations:** a deviation is **not** an exemption or exception.

How to: Go to NSLSI **Health and Safety – Applications** <u>https://novascotia.ca/lae/healthandsafety/forms.asp</u>

Deviation Application - Form 301  $\rightarrow$  Submit to Executive Director



## Common Compliance Issues / Causes

- Misplaced multiple lock device
- Improperly closed multiple lock
- No tag, no lock or both
- Lock not closed or key left in the lock
- One lock for several workers
- Lack of procedures
- Lack of training
- Competency

- Failure to completely stop equipment
- Failure to disconnect from all the power sources
- Failure to dissipate residual energy
- Accidental restarting of equipment
- Failure to clear work area before reactivation



#### Resources

This CSA standard can help you develop an effective lockout program CSA Z460:20 - *Control of hazardous energy - Lockout and other methods* 

https://www.csagroup.org/store/

WorkSafeBC

Controlling Hazardous Energy: De-Energization and Lockout <u>https://www.worksafebc.com/en/resources/health-safety/books-guides/</u>



Controlling Hazardous Energy De-Energization and Lockout





#### Questions?

## 1-800-9LABOUR "Make the Right Call" SafetyBranch@novascotia.ca howascotia.ca/workplace-and-technicalsafety/



# OPERATING ENGINEERS ALTERNATE RULES

ALTERNATIVE PATH'S IN ONTARIO

#### **Discussion Topics**

- Path 1 and Path 2 Alternate Rules Purpose
- Why is this happening?
- Changes being made
- Where to Find the Information
- Path 1 Break Down (category-based requirements)
- Path 2 Break Down (site-specific requirements)

#### The Purpose of The Alternate Rules

- Alternate rules are provided for certain requirements in the <u>Operating Engineers Regulation 219/01</u>, including plant staffing, certification time requirements, and electronic log book requirements; they provide a different approach to achieving safety compliance at Ontario's plants.
- Launching in phases, alternate rules facilitate a risk-based approach to the regulation, address qualifications for Operating Engineers and include two alternative paths for plants to achieve compliance.

 Registered plants will remain subject to the current regulation by default, but owners and users may opt-in to alternate rules and receive authorization from TSSA to operate under an alternate safety path.

#### Why is this happening?

- The regulations are not keeping pace with industry To modernize regulations
- Company's claim there are not enough certified Operating Engineers (OE) to fill positions
- To reduce the burden of the OE's attendance
- Change the way plants are rated for attendance
- Do hazard ranking and/or risk ranking



- \*\* Passing of Bill 66 in Ontario
- Result of the Deliotte report \*\* You can go and read the Deloitte report by typing "Deloitte report operating engineers Ontario". Select the first option from www.ontariocanada.com

#### Desired outcomes of the regulatory review

#### Primary Outcomes

• Maintain high-levels of public safety (inclusive of both employees and the broader public) Maintain the safety of property

#### Secondary Outcomes

- Impose a minimum burden on business (e.g., minimal cost, minimal administration)
- Provide industry with alternate paths to compliance
- Develop a sound evidence base and documented rationale for regulatory requirements
- Promote efficient use of technology
- User friendly and easy to understand
- Impose a minimum burden on candidates currently being qualified to join the industry and those currently working in the industry
- Implementable and enforceable
- Allows for changing circumstances in the OE field Relevant now and in the future

## Changes being made

- Path 1 of the Alternate Rules uses a risk rating for different categories of plants
- Path 2 of the Alternate Rules requires a site-specific Risk and Safety Management Plans
- Changes to qualifying experience time (QET) Time required for exams and certificates
- Disconnect from operating engineer exam writing from qualifying experience time

#### Where to find the information

- Go to <u>https://www.tssa.org</u>
- Click on Menu on the right of screen
- Click on Operating Engineers on the right of screen
- Click on Alternate Rules Operating Engineers on the left of screen
- Path 1 and Path 2 information is all there

#### Short Breakdown

#### PATH 1

- Staffing levels are based on a formula that considers a plant's power rating, technology and controls, among other factors.
- Plants are subject to regular TSSA inspections.

#### PATH 2

- The plan must be signed by a professional engineer and a senior person responsible for site safety and the plan must provide evidence to support the plant's ability to maintain safety, based on an acceptable risk level.
- If the plant's Risk and Safety Management Plan (RSMP) is approved by TSSA, the plant must maintain safety compliance records for review by TSSA.
- Plants are subject to regular TSSA inspections and audits of RSMP related documents and records.



Thank you!

#### Sources

Information

https://www.ontariocanada.com/registry/showAttachment.do?postingId=24645&attach mentId=34771

https://www.tssa.org/en/operating-engineers/operating-engineers-alternate-rules.aspx

https://www.tssa.org/en/operating-engineers/resources/Path-1-OE-Alternate-Rules-January-8-2021-vo.4.pdf

Photos Information

http://www.quickmeme.com/meme/3txqou

https://www.memecreator.org/meme/i-love-learning-about-regulations/

## Hydrogen In Nova Scotia



Changing energy for a changing world.



# Hydrogen?

Grey hydrogen	Blue hydrogen	Green hydrogen
Split natural gas into hydrogen and CO₂	Split natural gas into hydrogen and CO2	Split water into hydrogen by electrolysis powered by water or wind
CO2 emitted in the atmosphere	CO₂ stored or reused	No CO₂ emitted



Forward Energy.



# End Uses








# Final Energy Use Demand – Nova Scotia



# End Use Energy Demand – Nova Scotia



# Maritimes Hydrogen Feasibility Study

### By 2050, hydrogen can:

- Make up 22% of delivered energy in the Maritimes
- Account for 25% of our emissions reductions
- Provide grid-scale energy storage
- Help decarbonize key sectors
  - As a fuel for electricity production
  - By providing heat for buildings and industry
  - As a heavy transportation fuel





# GHG Emissions-Maritimes





# Halifax Hydrogen Deployment (H2D)









HYLYZER 1000-30





### Customers





• Fuel cell electric buses





Drayage Trucks



Shunt Trucks









# **Blending Today**

- Hong Kong (52% Town Gas)
- Singapore (65% Town Gas)
- Hawaii (15%)
- Keele University (20%)
- ATCO Ft Saskatchewan (5%-20%)
- Enbridge Markham (2%)





# **Proposed Projects**

- United Kingdom
  20% 22,000,000 Customers
- Enbridge Gatineau 20% - 40,000 customers
- Numerous 100% H2 projects





# Why Here?

- Net-Zero by 2050
- Hydrogen Ready
  System
- Modern Appliances







# Considerations

- Hydrogen embrittlement
- Leaks
- Energy Density
- End User
  Equipment







What We Know

- Distribution Systems
- Appliances



	20% Hydrogen	30% Hydrogen	100% Hydrogen
Plastic Pipes			
Steel Pipes			
Regulators, Meters and Pumps			
Typical End User Appliances			





#### Next Steps

- Engineering Evaluation
- Appliance Testing
- Customer Census

Changing energy for a changing world.



#### **2022 Education Forum Host**



**Our Future** 

**Our Profession** 

# Nova Scotia Institute of Power Engineers

#### **2022 Education Forum Presenting Sponsor**

# NOVASCOTIA

**Department of Labour, Skills, and Immigration** 

# MARTINE **Pressure Works Ltd.** "Helping Companies Under Pressure"

\_\_\_\_\_ EST - 1998 \_\_\_\_\_

# eastward energy

## Changing energy for a changing world.

Special Thanks to our 2022 Education Forum Presenters and Trade Show Vendors



#### **Education Forum Presenters**

Phil Reid – Swagelok Don Ehler – Technical Safety Jeff Dolan – Technical Safety Jude Rankin – IPE Jamie Swindells – Technical Safety Don Adams – Apprenticeship NS Tracy Boyer – Shift Change Don Hartt – Occupational Health & Safety Don Jardine – NSCC Patty Charlton - NSCC Tina Hennigar – Navigator Services Jordan MacNeil – Eastward Energy **George Solomon- Efficiency NS** Josh Hyslop – Nova Scotia Power Clayton White – IPE Sarah Lumsden - IPE