

**EN114**

**4th Class Power Engineering Part A-2**

**5 Credits**

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## EN114 Version: 5



### 4th Class Power Engineering Part A-2

#### Calendar Description

This course follows the latest SOPEEC syllabus and curriculum to prepare a student to take the “A” portion of the 4<sup>th</sup> Class power Engineer’s Certificate of Competency examination. This course covers the following subject material: elementary thermodynamic principles, plant and fire safety, materials and welding, basic electrotechnology, plant communications and high pressure boiler designs.

EN 114 covers in-depth the following subjects: materials and welding, electrotechnology, instrumentation & controls, boiler design, boiler systems.

#### Rationale

This is a required course for the Heavy Oil Power Engineering Diploma program (HOPE) and the Heavy Oil Operations Technician program (HOOT). It prepares the students with the specific skills and abilities required to challenge the Provincial 4th Class Power Engineering examination as set out by SOPEEC.

#### Prerequisites

#### Co-Requisites

[EN138](#)

#### Course Learning Outcomes

Upon successful completion of this course, students will be able to

1. identify basic types of matter, their properties, and the associated chemical principles.
2. explain the principles and laws of thermodynamics.
3. explain the modes of heat transfer and the theory of heat exchanger operation.
4. apply the thermodynamics principles through practical applications using the steam tables and the temperature-enthalpy chart.
5. describe general plant safety as it relates to Power Engineers.
6. explain common safety programs generally applied in plants.
7. describe the policies and procedures for safe storage and handling of dangerous materials.

8. explain fire safety in an industrial plant.
9. describe typical fire extinguishing equipment and its operation in plant environments.
10. describe the mechanical properties of engineering materials used in engineering.
11. describe welding processes relevant to the plant and Power Engineering.
12. describe inspection processes and testing methods for welds and materials.
13. apply the concepts of basic electricity while performing simple calculations using voltage, current, resistance, and power.
14. describe the basic principles of magnetism.
15. describe the design and application of electrical metering devices.
16. describe the operating principles of the various types of AC and DC motors and generators.
17. describe the operating principles of electrical transformers.
18. describe an electrical distribution system.
19. create engineering equipment sketches.
20. identify common types of diagrams used in plants.
21. describe the types and proper usage of plant communication systems.
22. discuss the basic theory of combustion, and the equipment used to provide proper combustion conditions within a boiler.
23. describe common fuel systems found in boiler systems.
24. describe basic concepts and equipment used to supply combustion air to boiler furnaces.
25. describe feedwater systems used with boilers.
26. explain the equipment, operation, and purpose of boiler blowoff and blowdown systems.
27. explain the types of boiler fireside cleaning equipment, their purpose, and their operation.

## **Resource Materials**

### ***Required Textbook(s):***

Power Engineering Fourth Class Edition 3 PanGlobal Training Systems Ltd.

Power Engineering Academic Supplement 2.0 (2017) PanGlobal Training Systems Ltd.

2018 ASME Academic Extract Boiler and Pressure Vessel Code Volume 1 PanGlobal Training Systems Ltd.

2018 ASME Academic Extract Boiler and Pressure Vessel Code Volume 2 PanGlobal Training Systems Ltd.

Extract of CSA Standards B51-09, B52-05 and B52S1-09 PanGlobal Training Systems Ltd.

Province of Alberta SAFETY CODES ACT “Power Engineers Regulation”

Province of Alberta SAFETY CODES ACT “Pressure welders Regulations”

Province of Alberta SAFETY CODES ACT “Pressure Equipment Safety Regulation”

Province of Alberta SAFETY CODES ACT “Pressure Equipment Exemption Order”

Province of Alberta SAFETY CODES ACT “Revised Statutes of Alberta 2000 Chapter S-1”

**An ABSA Approved Calculator From the Following List:**

Calculators beginning with the following will be permitted.			
CASIO	Sharp	Abacus	SX-11 Matrix...
fx-82...	EL-350...	Canon	F715...
fx-83...	EL-506...	Canon	F717...
fx-85...	EL-509...	Canon	F720...
fx-92...	EL-510...	Cebar	CD-402...
fx-95...	EL-520...	Citizen	SR-135...
fx-96...	EL-531...	Citizen	SR-260...
fx-100...	EL-533...	Citizen	SR-270...
fx-115...	EL-546...	HP	HP 8S...
fx-122...	EL-W516...	HP	HP 9S...
fx-220...	EL-W531...	HP	HP 10S...
fx-260...	EL-W532...	HP	HP 300...
fx-270...	EL-W532...	Insystem	IN-82SC...
fx-300...		Jastek	JasCS1...
fx-350...		Kenko	KK 82-TL...
fx-350...		Kenko	KK 87-MS...
fx-570...		Kenko	KK 350-TL...
fx-580...		KLT	FG-82BL...
fx-820...		Office One	720...
fx-901...		Office One	3000...
fx-911...		RadioShack	EC-4032...
fx-991...		RSB	FB 350...
fx-992...		Scholar	DS-82MS...
HL4...		Scholar	KD-350MS...
		Tandy	EC-4032...
		Texas Instruments	TI-30...
		Texas Instruments	TI-34...
		Texas Instruments	TI-36...
		Texas Instruments	TI-40...
		Texnet	Albert2,3,5...
		Texnet	fx1000...
			FA-83W...

## Conduct of Course

The course is delivered by classroom instruction using the material from the latest PanGlobal training systems Ltd. The course covers the topics outlined in the latest SOPEEC syllabus which is in line with Alberta Boiler Safety Association (ABSA). Additional reference materials are used to supplement the core material.

This course along with EN 110 is 218 hours in length and consists of lectures, assignments, tests, and a midterm and finale exam. The assignments are composed of handouts, workbook or D2L platform or a combination of these.

This course is delivered in lecture format using the material from the latest Pan Global Training Systems. The course covers the topics outlined in the SOPEEC syllabus which is in line with the Alberta Boiler Safety Association. Throughout the course, additional reference material is introduced, as well as cut-aways and displays are used to supplement the core material.

This course consists of 96 hours of lecture. Assignments are composed of handouts, chapter exercises, or D2L platform OR a combination.

## Evaluation Procedures

D2L Quiz	11%
Knowledge Exercises	12%
1 <sup>st</sup> Quarter Test	13%
2 <sup>nd</sup> Quarter Test	13%
3 <sup>rd</sup> Quarter Test	13%
4 <sup>th</sup> Quarter Test	13%
Final	25%

65% is the overall required course mark and a minimum of 50% on the final exam.

## Grade Equivalents and Course Pass Requirements

*A minimum grade of C+ (65%) is required to pass this course.*

Letter	F	C+	B-	B	B+	A-	A	A+
Percent Range	0-64	65-69	70-74	75-79	80-84	85-89	90-94	95-100
Points	0.00	2.30	2.70	3.00	3.30	3.70	4.00	4.00

65% is the overall required course mark to pass this course and a minimum of 50% on the final exam.

## **Attendance**

The Hoot and HOPE programs are approved courses by ABSA, and as such require our students to attend class. Section 4.A. The “School of Energy Hoot & Hope Student Handbook” provides the attendance details for this course.

## **Course Units/Topics**

### **Unit 2A Elementary Physical, Chemical and Thermodynamic Principles**

Introduction to Matter and Chemistry

Introduction to Thermodynamics

Introduction to Heat Transfer and Heat Exchangers

Thermodynamics of Steam

### **Unit 4A Introduction to Plant and Fire Safety**

Introduction to Plant Safety

Plant Safety Programs

Handling of Dangerous Materials

Plant fire Safety

Fire Extinguishing Methods and Equipment

### **Unit 6A Elements of Material Science and Welding Technology**

Energy Plant Construction and Operation Materials

Introduction to Welding

Welding and Pressure Vessel Inspection

## **Unit 8A Basic Concepts In Electrotechnology**

Basic Electricity

Magnetism and Electromagnetism

Electrical metering Devices

Motors and Generators

Transformers

Electrical Distribution Circuits

## **Unit 10A Fundamental Industrial Communication Skills**

Energy Plant Sketching

Plant Diagrams & Drawings

Plant Communications

## **Unit 11A Introduction to Boiler Designs**

Introduction to Boilers

Firetube Boilers

Watertube Boilers

Electric Boilers

Special Boiler Designs for Heating Plants

Differences Between Power and Heating Boilers



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