


STEAM BOILER ENGINEERS GRADE TWO (2) COURSE

	Training Dates:	As per schedule	Training Venue:	ALAF, Kuantan, Malaysia.
	Basic Fee:	RM6,000.00 per participant (this includes course materials, meals, refreshment and attendance certificate)		

DURATION

42 hours (Six (6) days)

TARGET GROUP

- Engineers, team leaders/coordinators, operations engineers, maintenance team leaders, and senior operations and maintenance personnel should possess the following minimum education background and work experience:-
 - Two years of working experience required for those with a bachelor's degree in mechanical engineering.
 - Three years of working experience required for those with qualifications other than a bachelor's degree in mechanical engineering.
- Experienced professionals who wish to review or broaden their understanding of steam boiler systems.
- Engineers intending to take the Steam Boiler Engineer's Certificate of Competency examination grade two (2) with the Department of Occupational Safety and Health, Malaysia (DOSH).

TARGETED INDUSTRY/INDUSTRIES

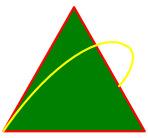
Oil & Gas, Petrochemicals, Power Plants, Renewable Energy Plants, Co-Generation Plants, Palm Oil Mills, Refineries, Plywood Industries, Hotels, and all industries utilizing steam for heating and mechanical drive.

CERTIFICATION

This course is approved by the Department of Occupational Safety and Health (DOSH), Malaysia.

COURSE OVERVIEW

This course will provide participants with detailed knowledge of the responsibilities of personnel involved in manufacturing, fabricating, and inspecting new steam boiler plant components, along with new construction activities as defined by ASME Section I and the Factories and Machinery Act of 1970.



The training course aims to enhance engineers' understanding of the requirements for selection, construction, commissioning, operation, inspection, repair, and maintenance of steam boilers. It aligns with International Codes & Standards and Malaysian laws such as the Occupational Safety and Health Act of 1994, Factories and Machinery Act of 1967 (Act 139), Regulations of 1970, and Regulations of 2014.

This course is mandatory for individuals intending to apply for the Grade 2 Steam Boiler Engineer's License examination with DOSH.

COURSE OUTCOMES

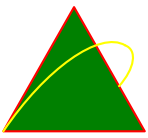
At the end of the course, delegates will be able to:

- Identify the related laws, codes, and standards for steam boiler design, installation, fabrication, operation, inspection, repair, and maintenance.
- Calculate the mechanical design of steam boiler main pressure parts, such as drums, tubes, and headers.
- Recognize the major hazards related to operating and maintaining boilers and steam systems.
- Safely operate steam boilers and steam systems.
- Describe the processes involved in boiler commissioning, operations, troubleshooting, inspections, repairs, and maintenance.
- Explain key parameters that affect boiler performance and efficiency.
- Understand the principles of thermodynamics as applied to steam boilers and steam systems.
- Explain the applications of steam in process plants and the power generation sector.
- Describe the basic controls used in boiler operation.
- Identify safety rules for boiler operation, from industrial combustion phenomena to feed water quality.
- Prepare to sit for the examination of the Steam Engineer's Certificate of Competency (Part B & Part C) Grade 2 with the Department of Occupational Safety and Health, Malaysia (DOSH)."

TRAINING METHODOLOGY

- Lecture
- Pre- and Post-Test
- Site visit
- Classroom discussions
- Short video presentation
- Case study

Note: Participants need to wear the required PPE, such as safety shoes, a jacket, safety glasses, and etc.



COURSE CONTENT

CHAPTER 1 – AN INTRODCUTION TO STEAM BOILERS

- Definition of Steam Boilers
- Purpose of Steam Boilers
- Fundamental of Steam and Water
- Terminology

CHAPTER 2 – LAWS AND STANDARDS (UNDANG-UNDANG DAN PAIWAIAN)

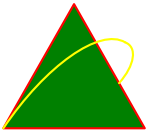
- Occupational, Safety and Health Act, 1994, and its Regulations and Orders
- New Laws related to the Amendment of OSHA 1994.
- Factories and Machinery Act, 1967, and its Regulations.
 - Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) Regulations, 1970.
 - Factories and Machinery (Person-In-Charge) Regulations, 1970.
 - Occupational Safety and Health (Notification of Accident, Dangerous Occurrence, Occupational Poising and Occupational Disease) Regulations 2004.
- Occupational Safety and Health (Use and Standards of Exposure of Chemicals Hazardous to Health) Regulations 2000.
- Industry Code of Practice for Safe Working in A Confined Space 2010.
- Industry Code of Practice for Management of Occupational Noise Exposure and Hearing Conservation 2019.
- Guidelines on Heat Stress Management at Workplace 2016.
- Guidelines On Ergonomics Risk Assessment at Workplace 2017.
- Plant safety, management, and maintenance policy.
- Steam Engineer's Roles and Responsibilities.
- Boiler House Management.

CHAPTER 3 – BOILER DESIGN

- Applicable Codes and Standards
- Steam Plant Conceptual Design
- Boiler Design
- Boiler fabrication process
- Boiler Components
- Parts, Essential Fittings and Safety Devices

CHAPTER 4 – STEAM BOILER INSTALLATION AND TESTING

- Steam Boiler Installation Procedures
- Cause and Effect Matrix
- Testing and Commissioning
- Refractory Drying Out Procedure
- Alkaline Boiling Out & Post Inspection Procedure
- Steam Blowing



- Steam Test
- Boiler Tuning

CHAPTER 5 – STEAM BOILER OPERATIONS

- Fundamental Operational Responsibilities
- Start-up and Shutdown
- Burner Operation and Interlock System
- Water Level Control System
- Pressure Control System
- Forced Draft Control System
- Furnace Purging
- Blowdown Control System
- Steam Pressure Control System
- Test Gauge Glass
- Emergency Shutdown
- Steam Management
- Boiler Efficiency & Burner Efficiency
- Storage of Idle Boiler
- Steam traps
- Boiler Water Treatment
- Steam Turbine Fundamentals

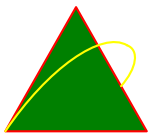
CHEPTER 6 – COMBUSTION OF FUELS

- Introduction of Combustion
- Types of Combustion
- Excess Air
- Flue Gas Analysis
- Combustion efficiency
- General Considerations Regarding Safety
- Steam Soot Blower
- Atomizer For Fuel Oils
- Types of Fuel
- Emission Controls

CHAPTER 7 – STEAM BOILER INSPECTION, MAINTENANCE AND REPAIR

Chapter 7.1 – Materials, Creep and Fatigue, Corrosion and Controls

- Classification of Materials
- Imperfection in Solids or Metals
- Mechanical Properties of Metals
- Tension Tests
- Plastic and Elastic Deformations
- Material's hardness
- Mechanisms of Strengthening in Metals



- Metal Failures
- Heat Treatment of Steels
- Heat Treatment (Annealing) of Ferrous Alloys
- Corrosion and its Controls

Chapter 7.2 - Welding Process

- Welding procedures
- Types of welding process
- Pre-heating
- Post weld heat treatment
- Test specimens
- Welding positions

Chapter 7.3 – Non-Destructive Testing (NDT)

- Advantages of Non-Destructive Testing (NDT)
- NDT Methods
 - Radiographic Testing (RT)
 - Ultrasonic Testing (UT)
 - Magnetic Particle Testing (MPI)
 - Eddy Current Testing
 - Dye-Penetrant Testing (DPI)
 - Visual Testing (VT)

Chapter 7.4 – Welding Mechanical Failures (Welding Defects)

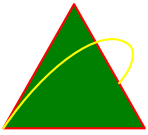
- Welding Defects
- External Welding Defects
- Internal Welding Defects

Chapter 7.5 – Boiler Defects and Potential Root Cause

- Typical Boiler Damages and Defects
- Boiler Defects
- Waterside Failure Mechanisms
- Fireside Failure Mechanisms
- General Failure Mechanisms

Chapter 7.6 - Steam Boiler Maintenance, Inspection and Repair

- Maintenance Objectives
- Safety Checklist for Inspection
- Boiler Maintenance Programs
- Maintenance Checks
- Steam Boiler Repairs



ABOUT THE INSTRUCTOR

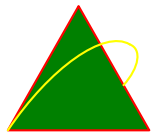


Ir. Mohd Normarzuki bin Ya'acob graduated with a Bachelor's (Honors) in Mechanical Engineering from the University of Malaya. He is a registered Professional Engineer with a Practicing Certificate (Mechanical) from the Board of Engineers, Malaysia (BEM), a Corporate Member of The Institution of Engineers, Malaysia (IEM) and a Professional Technologist from the Malaysia Board of Technologist (MBOT). Additionally, he holds certification as a First Grade Engineer (Steam Boiler and Internal Combustion Engine) from the Department of Occupational Safety and Health (DOSH).

His professional journey includes significant roles at various companies, including Equator Engineering Sdn Bhd, Tenaga Nasional Berhad, Petronas Gas Berhad (Gas Processing Plant 5/6 and Centralized Utilities Facility), and Qatar Petroleum (where he served as the Head of Short Technical Training). Presently, he serves as the Managing Director at Bayubali Engineering Sdn Bhd.

Throughout his career, Mohd Normarzuki has gained extensive field experience in steam boiler operation, troubleshooting, inspection, maintenance, and repair. He possesses expertise in project management, design, selection, specification, installation, maintenance, operation, plant optimization, and troubleshooting of utility facilities in the oil and gas industry.

He is also a co-author of the book "An Introduction to Steam Machinery," published by the University of Malaya Publisher.



TRAINING TIME TABLE						
STEAM ENGINEER GRADE 2 COURSE						
TIME	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6
08:30 - 10:30	Intoduction to Steam Boiler	Steam Boiler Installation and Testing	Boiler Operation	Boiler Operation	Combustion of Fuels	Welding Mechanical Failures (Welding Defects)
10:30 - 10:45	Morning Tea Break					
10:45 - 13:00	Laws and Standards	Steam Boiler Installation and Testing	Boiler Operation	Boiler Operation	Materials, Creep and Fatigue, Corrosion and Controls	Boiler Defects and Potential Root Cause
13:00 - 14:00	Lunch & Prayer					
14:00 - 15:30	Boiler Design	Steam Boiler Installation and Testing	Boiler Operation	Boiler Operation	Welding Process	Steam Boiler Maintenance
		Boiler Operation				
15:30 - 15:45	Afternoon Tea Break					
15:45 - 17:30	Boiler Design (Practical)	Boiler Operation	Boiler Operation	Combustion of Fuels	Non-Destructive Testing	Mock Up Test or Site Visit