BAYUBALI ENGINEERING SDN BHD

STEAM BOILER OPERATOR GRADE 1 & 2 COURSE

Training Dates:	As per schedule	**Training Venue:**	ALAF, Kuantan, Pahang.
Basic Fee:	The fee is RM4,320.00 inclusive SST per participant (this includes course materials, meals, refreshments, and an attendance certificate) and excludes the examination.		

DURATION

28 hours (Five (4) days)

TARGET GROUP

- New technician, operation technician, operation team leader/coordinator, maintenance, and inspection technicians.
- Technicians who want to sit for the Steam Boiler Operator's Certificate of Competency examination with the Department of Occupational Safety and Health, Malaysia (DOSH).

TARGETED INDUSTRY/INDUSTRIES

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

CERTIFICATION

This course is mandatory training for boiler operators willing to sit for the Steam Boiler Operator's Certificate of Competency examination with the Department of Occupational Safety and Health, Malaysia (DOSH).

COURSE OVERVIEW

The Steam Operator's Certificate of Competency (1st or 2nd Grade) Examinations are highly challenging, and self-study often proves ineffective. This training is designed in accordance with the Department of Occupational Safety and Health (DOSH) requirements.

Without this training, boiler operators are not permitted by law to obtain a Steam Boiler Certificate of Competency, as stipulated in the Occupational Safety and Health Act, 1994 (Amendment 2022). This course provides guidance to candidates, helping them successfully pass the examination by discussing frequently asked questions in detail and clarifying the examination requirements.

The training material is written in English; however, the teaching and explanations will include the national language.

COURSE OBJECTIVE

The course aims to enhance boiler operators' knowledge and understanding of the requirements for operation and maintenance of steam boilers in accordance with the best practices and laws in Malaysia (Occupational Safety and Health Act, 1994 (Amendment 2022)).

The training will also guide participants for the Steam Operator's Certificate of Competency Grade 1 and/or 2 Examinations.

COURSE OUTCOMES

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

- Identify the major hazards related to the operation and maintenance of boiler and steam systems.
- Operate steam boilers and steam systems under safe conditions.
- Describe the boiler commissioning, operations, troubleshooting, inspections, repairs, and maintenance processes.
- Describe key parameters affecting boiler performance and efficiency.
- Describe the principles of thermodynamics of steam boilers and steam systems.
- Describe the uses of steam in process plants and power generation sectors.
- Describe basic controls used in boiler operation.
- Sit for the examination of the Steam Boiler Operator’s Certificate of Competency Grade 1 or 2 with the Department of Occupational Safety and Health, Malaysia (DOSH).

TRAINING METHODOLOGY

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

COURSE CONTENTS

CHAPTER 1 – INTRODCUTION TO STEAM BOILERS

- What is a Steam Boiler?
- Definition of Steam Boilers
- Purpose of Steam Boilers
- Classification of Steam Boilers
- Heat Transfers in Steam Boilers
- Boiler efficiency
- Principle of Fire Tube and Water Tube Boilers

CHAPTER 2 – LAWS (OSHA 1994)

- An Overview of the Occupational Safety and Health Act, 1994 (Act 514) (Amendment 2022)
- Occupation Safety and Health (Plant Requiring Certificate of Fitness), Regulations 2024
- Occupation Safety and Health (Plant Requiring Certificate of Fitness), Regulations 2024: Schedule 8 – Essential Fittings

CHAPTER 3 – STEAM BOILER OPERATIONS AND TROUBLESHOOTING

- Steam Plant System
- Fundamental Operational Responsibilities
- Start-up and Shutdown
- Burner Operation and Interlock System
- Boiler Process Flow Diagram
- Boiler Carry-Over
- Steam Temperature Controls
- Water Level Control System
- Pressure Control System
- Draft Control System
- Furnace Purging
- Blowdown Control System
- Steam Pressure Control System
- Test Gauge Glass
- Boiler Emergencies
- Storage of Idle Boiler
- Steam Boiler Testing and Commissioning
  - Alkaline Boiling Out and Post Inspection Procedure
  - Steam Blowing Procedures
  - Steam Test Procedure
- Boiler Tuning
- Steam Traps

CHEPTER 4 – BOILER WATER TREATMENT

- Objectives of Water Treatment
- Introduction to Boiler Water Treatment
- Types of Water Treatments
  - External treatments
  - Internal Treatments
- Water carry-over problems
- Common Boiler Feed Water Treatment Concerns and its Remedies
- Potential problems in boiler water

CHEPTER 5 – COMBUSTION FUNDAMENTALS

- Introduction of Combustion
- Types of Combustion
  - Perfect combustion
  - Complete combustion
  - Incomplete combustion
- Excess Air
- Flue Gas Analysis
- Combustion efficiency
- General Considerations Regarding Safety
- Steam Soot Blower
- Atomizer for Fuel Oils
- Types of Fuel

CHEPTER 6 – STEAM TURBINE FUNDAMENTALS

- Introduction to Steam Turbine
- Operating Principles of Steam Turbines
- Typical Steam Turbine Applications
- Type of Steam Turbines
- Principle of Impulse Turbine
- Principle of Reaction Turbine
- Pre-Start-Up Checks and Start-up Guidelines
- Start-Up and Shutdown Procedures
- Steam Turbine Governor
- Steam Turbine Deposits, Erosion and Corrosion problems

CHAPTER 7 – STEAM BOILER MAINTENANCE

- Maintenance Objectives
- Safety Checklist for Inspection
- Boiler Maintenance Programs
  - Inspection and overhaul procedures
  - Overhaul scheduling

  - Equipment histories and spare parts inventories
  - Personnel training
  - Equipment improvement
- Maintenance Checks
- Steam Boiler Repairs
- Hydrostatic Test Procedure

CHAPTER 8 – STEAM BOILER FAILURES

- Types of failures
- Causes of Boiler Failures
- Preventive Measures to Avoid Steam Boiler Failures

TRAINING AND EXAMINATION REQUIREMENTS

General Requirements

- Must be a **Malaysian citizen**.
- Has never been charged or found guilty of any offence under Act 514 or its subsidiary regulations.
- Certified medically fit by an Occupational Health Doctor (OHD).
- Attend a **Steam Boiler Operator Course** conducted by a DOSH-approved training provider.
- Submit a registration application within one (1) year after passing the Steam Engineer exam.

Requirements for Steam Boiler Operator Grade 2 Examination

Option 1

a) Possesses at least an SPM or SKM Level 2 qualification in any field or its equivalent; and
b) Have at least 2 years of work experience related to steam boiler operations (must be verified by employer); and
c) Attend a **Steam Boiler Operator Grade 2 Course** conducted by a DOSH-approved training provider
d) Pass the Steam Boiler Operator Grade 2 Examination at a recognized Examination Centre.

Option 2

a) Possess SKM Level 3 in the field of Steam Boilers; and
b) Have at least 1 year of work experience related to steam boiler operations (must be verified by employer).
c) Attend a **Steam Boiler Operator Grade 2 Course** conducted by a DOSH-approved training provider
d) Pass the Steam Boiler Operator Grade 2 Examination at a recognized Examination Centre

Requirements for Steam Boiler Operator Grade 1 Examination

a) Have at least 6 months of work experience related to steam boiler operations as a Grade 2 Steam Boiler Operator.
b) Obtain verification from the employer or a **Steam Boiler Engineer Grade 1** for item (a); and
c) Attend the **Steam Boiler Operator Grade 1** Course at a Registered Training Provider
d) Pass the **Steam Boiler Operator Grade 1** Examination at a recognized Examination Centre.

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.