Engine W32LG Operation and Practical

1. Target group

This training course is aimed for marine and power plant personnel at the operational and management levels.

2. Prerequisites

The trainees should have a basic knowledge and operational experience of large medium speed engines. Theoretical education on internal combustion engines is preferred.

3. Objective

The participants will understand the design, operation and basic maintenance of the engine.

4. Duration

Recommended duration is five (5) working days.

5. Content

- General design and function of LG Engine
- Gas engine safety
- Gas fuel system
- Function of engine built-on systems
- Fuel gas, lubricating oil and cooling water requirements
- Engine automation system
- Engine operation
- Engine maintenance operations

6. Detailed learning objectives

At the completion of this training, **the trainee will be able to:**

1. General design and function of LG Engine

Describe the general design and function of SG Engine

Describe general design
Explain engine terminology
Explain the main data
Identify the engine main components
Explain the principle of lean-burn concept

2. Gas engine safety

Demonstrate an understanding of the gas engine safety

Explain the general health and safety aspects of gas
Explain the safety measures in the gas engine safety concept

3. Gas fuel system

Describe the configuration of the gas fuel system

Identify the components of the gas fuel unit
Explain or demonstrate the function of the unit
Explain the control and adjustment principles of the unit
Describe maintenance preparations

4. Function of engine built-on systems

Describe the configuration and the function of engine built-on systems

Identify the components and explain the function of:
- Fuel gas system
- Lubricating oil system
- Cooling water system
- Starting air system
- Charge air and exhaust gas system
- Control system

5. Fuel gas, lubricating oil and cooling water system requirements

Describe the requirements and the treatment for fuel gas and engine fluids.

Explain requirements and treatment of fuel gas, lubricating oil and cooling water

6. Engine automation system UNIC

Describe the function of engine automation systems

Explain the UNIC system basic design and function
Identify system hardware modules and instrumentation
Describe the principle of combustions process control
Explain governing functions, engine safety and monitoring features and individual cylinder control

Demonstrate the operation of the WOIS, Wärtsilä operating interface system (if applicable)
Demonstrate the operation of the service tool for UNIC (if applicable)

7. Engine operation

Demonstrate an understanding of the engine operations

Explain the needed procedures during engine start, stop and operation
Evaluate the engine basic operating data
Troubleshoot the engine operational basic faults

8. Engine maintenance operations

Demonstrate the maintenance operations

Describe the principle of maintenance schedule
Choose the correct maintenance tools and use those correctly and safely
Describe the construction and special features of engine main components
Measure the engine components and fill the measurement records
Demonstrate the basic level evaluation for the engine components
Demonstrate the main overhaul procedures correctly and safely by following the engine maintenance manual

Power Plant (Gas) Electrification

1. Target group

This training course is aimed for power plant personnel at the operational and management levels.

2. Prerequisites

The trainees should have a basic knowledge and operational experience of large medium speed engines. Theoretical education on internal combustion engines is preferred.

3. Objective

The participants will understand the working principles and operational function of each electrical system in the power plant thus enabling them to operate the plant in a safe and effective way.

4. Duration

Recommended duration five (5) working days.

5. Content

- General Electrical Plant Design and Operation Modes
- Engine control, Instrumentation and Automation systems
- Alternator and Automatic Voltage Control
- Plant Control and Monitoring System
- Power Distribution System

6. Detailed learning objectives

At the completion of this training, **the trainee will be able to:**

1. General Electrical Plant Design and Operation Modes

Demonstrate an understanding of the power plant's general arrangement and documentation.

Utilize power plant installation documentation
Familiarize with general electrical plant design and equipment
Describe different operation modes in island or parallel with grid operation

2. Engine Control, Instrumentation and Automation System

Describe the general design of the engine control system.

Describe function of different sensor/actuator types
Describe function of UNIC automation system

3. Alternator and Automatic Voltage Control

Describe the configuration and the function of the alternator.

Identify the components and explain the function of alternator and voltage control system
- Automatic Voltage Regulator
- Voltage and current measurement
- Alternator Protection System

4. Plant Control and Monitoring System

Describe the operation, monitoring and supervision system

Explain main start, stop and operation steps
Explain plant's monitoring and supervision system
Familiarize with human machine interface WOIS/WISE
Familiarize with plant control and communication system

5. Power Distribution System

Describe the power plant electrical distribution system

Identify major components of the power distribution system
Operation of MV, LV and DC systems
General safety and maintenance principles

Power Plant LG engine
Operation and Maintenance at site

1. Target group

This training course is aimed for power plant personnel at the operational and management levels.

2. Prerequisites

The trainees should have a basic knowledge and operational experience of large medium speed engines. Theoretical education on internal combustion engines is preferred.

3. Objective

The participants will understand the design, operation and basic maintenance of the engine power plant.

4. Duration

Recommended duration ten (10) working days.

5. Content

- General design and function of LG Engine
- Gas engine safety
- Gas regulating system
- Function of engine built-on systems
- Fuel oil, fuel gas, lubricating oil and cooling water requirements
- Engine operation
- Engine maintenance operations
- General design of power plant
- Function of auxiliary systems
- Auxiliary systems operation
- Auxiliary systems maintenance operations

6. Detailed learning objectives

At completion of this training, the trainee will be able to:

1.	General design and function of LG Engine

Describe the general design and function of LG Engine

Describe general design
Explain engine terminology
Explain the main data
Describe the construction and special features of engine main components
Explain the principle of LG engine concept and combustion

2.	Gas engine safety

Demonstrate an understanding of the gas engine safety

Explain the general health and safety aspects of gas
Explain the safety measures in the dual fuel engine safety concept

3.	Function of engine built-on systems

Describe the configuration and the function of engine built-on systems

Identify the components and explain the function of:
- Fuel system (fuel gas, main fuel and pilot fuel injection system)
- Lubricating oil system
- Cooling water system
- Starting air system
- Charge air and exhaust gas system

4.	Fuel oil, fuel gas, lubricating oil and cooling water system requirements

Describe the requirements and the treatment for fuels and engine fluids.

Explain requirements and treatment of fuel oil, fuel gas, lubricating oil, cooling water

5.	Engine operation

Demonstrate an understanding of the engine operations

Explain the DF engine operating modes
Explain the needed procedures during engine start, stop and operation
Evaluate the basic engine operating data
Troubleshoot the engine operational basic faults

6.	Engine maintenance operations

Demonstrate the maintenance operations

Describe the principle of maintenance schedule
Choose the correct maintenance tools and use those correctly and safely
Measure the engine components and fill the measurement records
Demonstrate the basic level evaluation for the engine components
Explain the main overhaul procedures correctly and safely by following the engine maintenance manual

7. General design of power plant

Demonstrate an understanding of the power plant's general arrangement and documentation.

Utilize power plant installation documentation
Read and use power plant's flow diagrams
Describe plant's general arrangement

8. Function of engine auxiliary systems

Describe the configuration and the function of engine auxiliary systems

Identify the components and explain the function of:
- Fuel system (fuel gas, main fuel and pilot fuel injection system)
- Lubricating oil system
- Cooling water system
- Starting air system
- Charge air and exhaust gas system

9. Auxiliary systems operation

Describe the operational procedures of the engine auxiliary systems

Explain preparation, operation and supervision procedures of plant's auxiliary systems including fuel, lubrication oil, cooling water, compressed air and charge air & exhaust systems.

10. Auxiliary systems maintenance operations

Demonstrate the auxiliary system maintenance operations

Describe the principle of maintenance schedule
Explain the main overhaul procedures correctly and safely by following the auxiliary systems maintenance manual

Power Plant (Gas) Electrification at site

1. Target group

This training course is aimed for power plant personnel at the operational and management levels.

2. Prerequisites

The trainees should have a basic knowledge and operational experience of large medium speed engines. Theoretical education on internal combustion engines is preferred.

3. Objective

The participants will understand the working principles and operational function of each electrical system in the power plant thus enabling them to operate the plant in a safe and effective way.

4. Duration

Recommended duration five (5) working days.

5. Content

- General Electrical Plant Design and Operation Modes
- Engine control, Instrumentation and Automation systems
- Alternator and Automatic Voltage Control
- Plant Control and Monitoring System
- Power Distribution System

6. Detailed learning objectives

At the completion of this training, **the trainee will be able to:**

1. General Electrical Plant Design and Operation Modes

Demonstrate an understanding of the power plant's general arrangement and documentation.

Utilize power plant installation documentation
Familiarize with general electrical plant design and equipment
Describe different operation modes in island or parallel with grid operation

2. Engine Control, Instrumentation and Automation System

Describe the general design of the engine control system.

Describe function of different sensor/actuator types
Describe function of UNIC automation system

3. Alternator and Automatic Voltage Control

Describe the configuration and the function of the alternator.

Identify the components and explain the function of alternator and voltage control system
- Automatic Voltage Regulator
- Voltage and current measurement
- Alternator Protection System

4. Plant Control and Monitoring System

Describe the operation, monitoring and supervision system

Explain main start, stop and operation steps
Explain plant's monitoring and supervision system
Familiarize with human machine interface WOIS/WISE
Familiarize with plant control and communication system

5. Power Distribution System

Describe the power plant electrical distribution system

Identify major components of the power distribution system
Operation of MV, LV and DC systems
General safety and maintenance principles