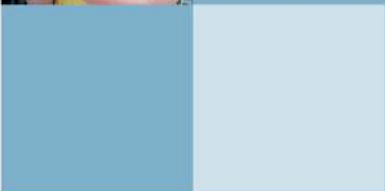
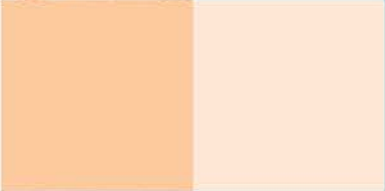


**ita**  
**YOUR TICKET.**



## PROGRAM OUTLINE

### Marine Fitter Endorsement



The latest version of this document is available in PDF format on the ITA website  
[www.itabc.ca](http://www.itabc.ca)

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# **MARINE FITTER ENDORSEMENT PROGRAM OUTLINE**

**APPROVED BY INDUSTRY  
MAY 2017**

**Developed by  
Industry Training Authority  
Province of British Columbia**



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# **Section 1**

## **INTRODUCTION**

### **Marine Fitter Endorsement**

## Foreword

This Program Outline is for use in Marine Fitter Endorsement training classes sponsored by the Industry Training Authority and will be used as a curriculum planning guide for instructors in the formal classroom portions of apprenticeship training.

Practical demonstration and student participation should always be integrated with classroom sessions.

Safe working practices, though not always specified in each of the competencies and learning tasks, are an implied part of the program and should be stressed throughout the apprenticeship.

Achievement Criteria set a common minimum standard for training providers to measure achievement of practical competencies. Achievement Criteria are included only for competencies that require a practical assessment. Where Achievement Criteria are specified, the apprentice must achieve the specifications, safety standards and timeframes described.

Competencies that are solely theory-based will be assessed through a multiple choice test(s) for which the apprentice must achieve a minimum score of 70%.

This Program Outline includes a list of recommended reference textbooks that are available to support the learning objectives and the minimum shop requirements needed to support instruction.

### **SAFETY ADVISORY**

Be advised that references to the WorkSafe BC safety regulations contained within these materials do not/may not reflect the most recent Occupational Health and Safety Regulation (the current Standards and Regulation in BC can be obtained on the following website: <http://www.worksafebc.com>). Please note that it is always the responsibility of any person using these materials to inform him/herself about the Occupational Health and Safety Regulation pertaining to his/her work.

## Acknowledgements

The Marine Fitter program was developed from 2011 – 2017. During this time, Subject Matter Experts were convened to review and revise the BC Program Profile and Program Outline. The following are the Subject Matter Experts who participated in these reviews:

### 2017

- Brian Beasley, Seaspan Vancouver Shipyards
- Ken Crooks, Department of National Defense (DND)
- Ryan Fischer, Seaspan Victoria Shipyards
- Peter Thomas, BC Institute of Technology

### 2015

- Brian Beasley, Seaspan Vancouver Shipyards
- Tony DenOtter, Department of National Defense (DND)
- Ryan Fischer, Seaspan Victoria Shipyards
- Don Smith, BC Institute of Technology
- Peter Thomas, BC Institute of Technology

### 2013

- Ken Crooks, Department of National Defense (DND)
- Tony DenOtter, Department of National Defense (DND)
- Jim Fitzpatrick, Boilermakers Lodge #191
- Glen Gibson, Department of National Defense (DND)
- Merike Kolga, Seaspan
- Peter Lorimer, Seaspan
- David Meek, Camosun College
- John Taylor, Seaspan
- Garry Waugh, BC Ferry Corporation
- Dan Wood, Stonecoast Group

### 2011

- Steve Barnes, Vancouver Dry Dock
- Gordon Dearie, Victoria Shipyards
- Tony DenOtter, Department of National Defense (DND)
- Ryan Fischer, Seaspan Victoria Shipyards
- David Meek, Camosun College
- John Taylor, Vancouver Shipyards

The Industry Training Authority would like to acknowledge the dedication and hard work of all industry and training provider representatives appointed to identify the training requirements of the Marine Fitter endorsement.

## How to Use this Document

This Program Outline has been developed for the use of individuals from several different audiences.

The table below describes how each section can be used by each intended audience.

Section	Training Providers	Employers/ Sponsors	Program Apprentices	Program Challengers
<b>Program Credentialing Model</b>	Communicate program length and structure, and all pathways to completion	Understand the length and structure of the program	Understand the length and structure of the program, and pathway to completion	Understand challenger pathway to Certificate of Qualification
<b>OAC</b>	Communicate the competencies that industry has defined as representing the scope of the occupation	Understand the competencies that an apprentice is expected to demonstrate in order to achieve certification	View the competencies they will achieve as a result of program completion	Understand the competencies they must demonstrate in order to challenge the program
<b>Training Topics and Suggested Time Allocation</b>	Shows proportionate representation of various GACs at each program level; should map to proportions of time spent on training, practical experience, and assessment	Understand the relative scope of various areas of the occupation, and areas in which the apprentice would require on-the-job experience	Understand the relative scope of various areas of the occupation, and areas in which on-the-job experience would be provided	Understand the relative weightings of various areas of the occupation on which assessment is based
<b>Program Outline</b>	Defines the objectives, learning tasks, high level content that must be covered for each competency, as well as defining observable, measureable achievement criteria for objectives with a practical component	Identifies detailed program content and performance expectations for competencies with a practical component; may be used as a checklist prior to signing a recommendation for certification (RFC) for an apprentice	Provides detailed information on program content and performance expectations for demonstrating competency	Allows individual to check program content areas against their own knowledge and performance expectations against their own skill levels
<b>Training Provider Standards</b>	Defines the facility requirements, tools and equipment, reference materials (if any) and instructor requirements for the program	Identifies the tools and equipment an apprentice is expected to have access to; which are supplied by the training provider and which the student is expected to own	Provides information on the training facility, tools and equipment provided by the school and the student, reference materials they may be expected to acquire, and minimum qualification levels of program instructors	Identifies the tools and equipment a tradesperson is expected to be competent in using or operating; which may be used or provided in a practical assessment





# **Section 2**

## **PROGRAM OVERVIEW**

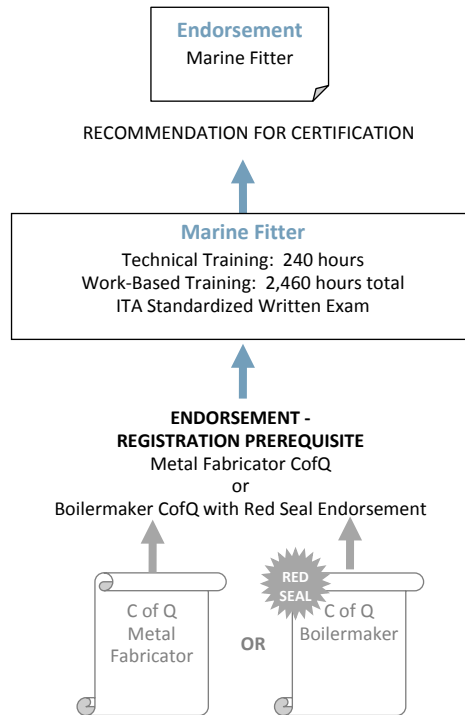
### **Marine Fitter Endorsement**



## Program Credentialing Model

### Marine Fitter Endorsement (Optional)

This graphic provides an overview of the Marine Fitter post-certification endorsement.





## Occupational Analysis Chart

### MARINE FITTER

**Occupation Description:** Marine Fitters work in the Shipbuilding and Repair Industry to cut and fit metal plates and other components in the process of assembling, constructing and repairing large vessels.

<b>UNDERSTAND THE SHIPBUILDING AND REPAIR INDUSTRY</b> <span style="float: right;">A</span>	Identify shipbuilding processes <span style="float: right;">A1</span>	Describe ship transfer <span style="float: right;">A2</span>	Use marine industry terminology <span style="float: right;">A3</span>																										
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<b>DEMONSTRATE SAFE WORK PRACTICES</b> <span style="float: right;">B</span>	Identify safe work practices to shipyard environments <span style="float: right;">B1</span>	Work safely in high hazard environments <span style="float: right;">B2</span>	Apply safe rigging practices <span style="float: right;">B3</span>																										
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<b>READ SHIP DRAWINGS</b> <span style="float: right;">C</span>	Use construction drawings <span style="float: right;">C1</span>	Use multiple drawing sets <span style="float: right;">C2</span>																											
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<b>CREATE LOFTS</b> <span style="float: right;">D</span>	Apply the lofting process <span style="float: right;">D1</span>	Develop an initial lines plan <span style="float: right;">D2</span>	Refine an initial lines plan <span style="float: right;">D3</span>	Proof a refined lines plan <span style="float: right;">D4</span>																									
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<b>CONSTRUCT AND REPAIR SHIP STRUCTURES</b> <span style="float: right;">E</span>	Use a jig in ship construction <span style="float: right;">E1</span>	Assemble ship structures <span style="float: right;">E2</span>	Outfit ships <span style="float: right;">E3</span>	Erect hull blocks <span style="float: right;">E4</span>	Repair ship structures <span style="float: right;">E5</span>																								
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## Training Topics and Suggested Time Allocation

### MARINE FITTER - ENDORSEMENT

		% of Time Allocated to:			
		% of Time	Theory	Practical	Total
<b>Line A</b>	<b>UNDERSTAND THE SHIPBUILDING AND REPAIR INDUSTRY</b>	<b>21%</b>	100%	0%	100%
A1	Identify shipbuilding processes		✓		
A2	Describe ship transfer		✓		
A3	Use marine industry terminology		✓		
<b>Line B</b>	<b>DEMONSTRATE SAFE WORK PRACTICES</b>	<b>8%</b>	50%	50%	100%
B1	Identify safe work practices to shipyard environments		✓		
B2	Work safely in high hazard environments		✓	✓	
B3	Apply safe rigging practices		✓	✓	
<b>Line C</b>	<b>READ SHIP DRAWINGS</b>	<b>18%</b>	60%	40%	100%
C1	Use construction drawings		✓	✓	
C2	Use multiple drawing sets		✓	✓	
<b>Line D</b>	<b>CREATE LOFTS</b>	<b>25%</b>	10%	90%	100%
D1	Apply the lofting process		✓		
D2	Develop an initial lines plan		✓	✓	
D3	Refine an initial lines plan		✓	✓	
D4	Proof a refined lines plan		✓	✓	
<b>Line E</b>	<b>CONSTRUCT AND REPAIR SHIP STRUCTURES</b>	<b>28%</b>	10%	90%	100%
E1	Use a jig for use in ship construction		✓		
E2	Assemble ship structures		✓	✓	
E3	Outfit ships		✓	✓	
E4	Erect hull blocks		✓		
E5	Repair ship structures		✓		
<b>Total Percentage for Marine Fitter Endorsement</b>		<b>100%</b>			



# **Section 3**

## **PROGRAM CONTENT**

### **Marine Fitter**



**Line (GAC):            A    UNDERSTAND THE SHIPBUILDING AND REPAIR  
INDUSTRY**

**Competency:            A1   Identify shipbuilding processes**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe the work responsibilities and tasks of journeyman marine fitters in a variety of work settings.
- Explain construction methods and processes used in the shipbuilding and repair industry.
- Identify and describe classification standards relevant to the shipbuilding and repair industry
- Clarify shipbuilding trades and responsibilities.

**LEARNING TASKS**

**CONTENT**

- |   |   |
|---|---|
| <p>1.    Describe the history of the Marine Fitter trade</p>        | <ul style="list-style-type: none"> <li>• Platers</li> <li>• Shipbuilding in Canada/BC</li> </ul>  |
| <p>2.    Describe the scope of the Marine Fitter trade</p>          | <ul style="list-style-type: none"> <li>• Docking ships</li> <li>• Hull construction</li> <li>• Installations equipment</li> <li>• Fitting out ships</li> <li>• Critical measurements</li> <li>• Apply ship construction standards</li> <li>• Quality control</li> <li>• Read drawings</li> <li>• Lofting</li> <li>• Shop equipment usage               <ul style="list-style-type: none"> <li>○ Brake press</li> <li>○ Shears</li> <li>○ Iron worker</li> <li>○ Welding</li> </ul> </li> <li>• Rigging</li> </ul> |
| <p>3.    Describe interaction with other trades and departments</p> | <ul style="list-style-type: none"> <li>• Rigging</li> <li>• Shipwrights</li> <li>• Engineering</li> <li>• Design</li> <li>• Technical services</li> <li>• Mechanical / engine fitters / machining</li> <li>• Pipefitting</li> <li>• Planning / estimating</li> <li>• Electrical</li> <li>• Welding</li> </ul>   |



**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| <p>4. Describe construction methods and processes used in the shipbuilding and repair industry</p> <p>5. Identify classification societies providing standards for the shipbuilding and repair industry</p> <p>6. Describe roles and responsibilities of classification societies</p> <p>7. Describe survey type and frequency</p> | <ul style="list-style-type: none"> <li>• QC / QA</li> <li>• Manufacturing block and modular components vs. conventional shipbuilding</li> <li>• Product work breakdown structure (PWBS)</li> <li>• Production flow of a modern shipyard</li> <li>• Panel line overview and components             <ul style="list-style-type: none"> <li>○ Assembly and sub-assembly</li> <li>○ Modules</li> <li>○ Blocks</li> <li>○ Grand blocks</li> <li>○ Outfitting</li> </ul> </li> <li>• Flat panel, curved panel pre-outfitting, outfitting, erection</li> <li>• SNAME (Society of Naval Architects and Marine Engineers)</li> <li>• IACS (International Association of Classification Societies)</li> <li>• Lloyds Register Marine</li> <li>• BV (Bureau Veritas)</li> <li>• ISO (International Organization for Standardization)</li> <li>• Canadian Welding Bureau</li> <li>• American Welding Society</li> <li>• Transport Canada</li> <li>• ABS (American Bureau of Shipping)</li> <li>• DNV (Det Norske Veritas)</li> <li>• ASME (American Society of Mechanical Engineers)</li> <li>• Worker             <ul style="list-style-type: none"> <li>○ Foreman</li> <li>○ Charge hand</li> <li>○ Manager</li> </ul> </li> <li>• Inspector</li> <li>• Marine surveyor</li> <li>• Naval architect</li> <li>• Marine engineer</li> <li>• Quality Assurance inspectors</li> <li>• Standards &amp; Measurement personnel</li> <li>• Annual, 3 year &amp; 5 year survey</li> <li>• Special</li> </ul> |
|--|--|



**LEARNING TASKS**

8. Describe materials classification as it relates to IACS

**CONTENT**

- Steel plate
- Steel structural members





**Line (GAC):**        **A    UNDERSTAND THE SHIPBUILDING AND REPAIR INDUSTRY**

**Competency:**       **A2   Describe ship transfer**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe ship launching systems.
- Describe ship transport systems.
- Describe the ship docking/undocking process.

**LEARNING TASKS**

**CONTENT**

- |   |   |
|---|---|
| <p>1. Describe ship launching systems</p>     | <ul style="list-style-type: none"> <li>• Side launch</li> <li>• Marine railway</li> <li>• Synchro lift</li> <li>• Slipway</li> <li>• Floating dry dock               <ul style="list-style-type: none"> <li>○ Capstan</li> </ul> </li> <li>• Graving dock               <ul style="list-style-type: none"> <li>○ Capstan</li> </ul> </li> <li>• Tide grid</li> </ul>  |
| <p>2. Describe ship transport systems</p>     | <ul style="list-style-type: none"> <li>• Self-Propelled Modular Transporter (SPMT)</li> <li>• Cradle</li> <li>• Railway</li> <li>• Turntable</li> <li>• Travel lift</li> <li>• Trailer</li> </ul>   |
| <p>3. Describe docking/undocking a vessel</p> | <ul style="list-style-type: none"> <li>• Roles and responsibilities               <ul style="list-style-type: none"> <li>○ Dock Master                   <ul style="list-style-type: none"> <li>– Docking plan</li> <li>– Coordination</li> </ul> </li> <li>○ Naval architects</li> <li>○ Engineers</li> <li>○ Shipwrights</li> <li>○ Divers</li> <li>○ Rigging crew</li> <li>○ Pilots</li> <li>○ Tugs</li> </ul> </li> <li>• Safety procedures</li> <li>• Environmental</li> <li>• Blocks</li> </ul> |



**LEARNING TASKS**

**CONTENT**

- Placement
  - Hull appendage
- Setting
- Design
- Types



**Line (GAC):**        **A    UNDERSTAND THE SHIPBUILDING AND REPAIR INDUSTRY**

**Competency:**      **A3    Use marine industry terminology**

**Objectives**

To be competent in this area, the individual must be able to:

- Identify ship terms.

**LEARNING TASKS**

1. Identify ship terms

**CONTENT**

- Parts of a ship
  - Primary
  - Secondary
- Areas of a ship
- Locations
- Directions
- Ship specifications
  - Breadth
  - LOA
  - Draft
  - Freeboard
- Safety equipment
- Tools/Equipment
- Staff/Personnel
- Processes
  - Lofting
  - Part production
  - Machinery
  - Departments



**Line (GAC):            B    DEMONSTRATE SAFE WORK PRACTICES**  
**Competency:            B1   Identify safe work practices to shipyard environments**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe Canada Labour Code and WorkSafeBC regulations specifically related to hazards in the shipbuilding and repair industry and to marine fitter work in particular.
- Describe safe work practices for workplaces in the shipbuilding and repair industry.

**LEARNING TASKS**

**CONTENT**

- |  |   |
|--|---|
| <p>1. Describe federal and provincial regulations specific to the shipbuilding and repair industry</p> | <ul style="list-style-type: none"> <li>• Canada Labour Code Part 2</li> <li>• WorkSafeBC regulations</li> <li>• Occupational Safety and Health Association (OSHA)</li> </ul>  |
| <p>2. Identify industry specific safe work practices</p>   | <ul style="list-style-type: none"> <li>• Confined space entry</li> <li>• Hotwork</li> <li>• Work hazard assessment</li> <li>• Toolbox talk (safety meeting)</li> <li>• Field Level Risk Assessment (FLRA)</li> <li>• Radiation hazards (Rad Haz)</li> <li>• Lockout procedures</li> <li>• Fall arrest</li> <li>• Man aloft (and extraction)</li> <li>• Flotation</li> <li>• Ship staff               <ul style="list-style-type: none"> <li>○ Coordination</li> <li>○ Roles and responsibilities</li> <li>○ General liaison</li> <li>○ Documentation</li> </ul> </li> </ul> |
| <p>3. Describe permits</p>   | <ul style="list-style-type: none"> <li>• Hot work</li> <li>• Confined space</li> <li>• Work Aloft</li> <li>• Rad Haz</li> </ul>   |



**Line (GAC):            B    DEMONSTRATE SAFE WORK PRACTICES**  
**Competency:           B2   Work safely in high hazard environments**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe requirements for protective equipment in the shipbuilding and repair industry.
- Use protective equipment in shipbuilding and repair industry workplaces.

**LEARNING TASKS**

**CONTENT**

1. Recognize hazards	<ul style="list-style-type: none"> <li>• Lead</li> <li>• Asbestos</li> <li>• Respiratory hazards</li> <li>• Lead-based paints</li> <li>• Protective equipment</li> </ul>
2. Describe protective equipment unique to shipbuilding and repair industry	<ul style="list-style-type: none"> <li>• Respirators</li> <li>• Air fed</li> <li>• Fall arrest</li> <li>• Hazmat suits</li> <li>• Personal flotation devices</li> </ul>
3. Apply procedures for working in high hazard environments	<ul style="list-style-type: none"> <li>• WHMIS 2015</li> <li>• Safe Working Practices (SWP)</li> <li>• Safe Operating Procedures (SOP)</li> <li>• Field Level Risk Assessment (FLRA)</li> <li>• Environmental and Job Hazard Analysis</li> <li>• Tool box talk</li> </ul>

**Achievement Criteria**

Performance	The learner will be able to select, inspect and use appropriate protective equipment for high hazard environments.
Conditions	The learner will be given: <ul style="list-style-type: none"> <li>• A simulated hazardous workplace</li> <li>• PPE</li> </ul>
Criteria	The learner will be evaluated on: <ul style="list-style-type: none"> <li>• Correct hazard identification</li> <li>• Select appropriate protective equipment and workplace procedures</li> <li>• Use equipment correctly</li> </ul>



**Line (GAC): B DEMONSTRATE SAFE WORK PRACTICES**

**Competency: B3 Apply safe rigging practices**

**Objectives**

To be competent in this area, the individual must be able to:

- Identify the safe procedures and equipment required to execute a lift
- Develop a lift plan
- Describe safe use of slings and attachments.
- Identify appropriate rigging configurations and safe rigging approaches.
- Identify correct load calculations.

**LEARNING TASKS**

**CONTENT**

- |                                    |   |
|------------------------------------|---|
| 1. Identify rigging equipment      | <ul style="list-style-type: none"> <li>• Slings</li> <li>• Attachments               <ul style="list-style-type: none"> <li>○ Plate grabs</li> <li>○ Spreader beams</li> </ul> </li> </ul>  |
| 2. Develop a lift plan/plan a lift | <ul style="list-style-type: none"> <li>• Safety factors</li> <li>• Equipment inspection</li> <li>• Load calculations</li> <li>• Centre of balance</li> <li>• Communication               <ul style="list-style-type: none"> <li>○ Hand signals</li> <li>○ Radios</li> </ul> </li> <li>• Swing control</li> <li>• Load transit</li> <li>• Crane operation</li> <li>• Coordination with drop point</li> </ul> |
| 3. Hoist a load                    | <ul style="list-style-type: none"> <li>• Centered</li> <li>• Off-Centered</li> <li>• Balanced load</li> <li>• Unbalanced load</li> </ul>  |

**Achievement Criteria**

**Performance** The learner will be able to plan and conduct the lift of an asymmetric load.

- Conditions** The learner will be given:
- An overhead crane
  - Rigging equipment
  - An asymmetric load
  - PPE



Criteria

The learner will be evaluated on:

- Demonstration of a controlled lift
- Safe material handling
- Work safely and in a professional manner



**Line (GAC):** C READ SHIP DRAWINGS

**Competency:** C1 Use construction drawings

### Objectives

To be competent in this area, the individual must be able to:

- Describe the purpose and applications of drawings in the shipbuilding and repair industry.
- Use drawings to fabricate a component.

### LEARNING TASKS

1. Describe types of drawings used in shipbuilding and repair
  
2. Identify key components of drawings
  
3. Use drawings to fabricate a component

### CONTENT

- Drawing orientation
  - Deck
  - Section
  - Lines
  - Construction
- Arrangements
- Work packages
  - Detail drawing
  - Assembly drawing
  - Assembly sequence
- Shell expansion plan
  
- Marine symbols
  - Mid-ship
  - Plimsoll
  - Sub-surface hazards
  - Stability marks
  - Tug areas
- Terminology
  
- Specifications
- Standards (IACS)
- Fabrication sequence
- Interference
- Layout
- Materials
  - Associated marine structural shapes

### Achievement Criteria

**Performance** The learner will be able to use a simple drawing to fabricate an outfitting component.

- Conditions** The learner will be given:
- Ship construction drawing
  - Materials
  - 1/4" (6 mm) steel plate (or heavier)
  - Shop space





- Shop equipment
- Material handling equipment
- Shop tools
- 12 hours to fabricate an outfitting component

Criteria

The learner will be evaluated on:

- Consistency of faying surface (gaps less than 3/16" or 5 mm)
- Profile/forming
- Codes and standards
  - Finish
  - Accuracy
  - Tolerances to 1/16" (2 mm)
  - Welding
  - Distortion
  - Alignment
- Safe material handling
- Work safely and in a professional manner
- Labeling



**Line (GAC):**        **C**   **READ SHIP DRAWINGS**

**Competency:**      **C2**   **Use multiple drawing sets**

**Objectives**

To be competent in this area, the individual must be able to:

- Use multiple drawing sets to illustrate advanced components.
- Layout an advanced hull structure.

**LEARNING TASKS**

**CONTENT**

- |  |   |
|--|---|
| <p>1. Identify key components of multiple drawings</p> | <ul style="list-style-type: none"> <li>• Marine symbols</li> <li>• Marine terminology</li> <li>• Dimensions (Table of Offset vs. Conventional)</li> <li>• Materials identification in drawings</li> <li>• Standard drawing information               <ul style="list-style-type: none"> <li>○ Legend</li> <li>○ Title block</li> </ul> </li> <li>• Cut aways</li> <li>• Section views</li> <li>• Specs table</li> </ul> |
| <p>2. Use multiple drawing sets</p>                    | <ul style="list-style-type: none"> <li>• Table of specifications</li> <li>• Workflow               <ul style="list-style-type: none"> <li>○ Fabrication sequence</li> <li>○ Installation requirements</li> <li>○ Interference</li> </ul> </li> <li>• Sub-assembly</li> <li>• Layout</li> <li>• Patterns</li> <li>• Jigs</li> <li>• Materials</li> <li>• Equipment</li> </ul>  |
| <p>3. Interpret a lines plan</p>                       | <ul style="list-style-type: none"> <li>• Construction drawings</li> <li>• General arrangement drawings</li> <li>• Structural attachments</li> <li>• Structural configuration</li> <li>• Weld considerations</li> <li>• Relevant angles</li> <li>• Joint configurations</li> <li>• Coordinate reference</li> <li>• Moulded line policy</li> <li>• Frame spacing</li> </ul>   |



**LEARNING TASKS**

**CONTENT**

- |   |   |
|---|---|
| 4. Develop a shop drawing (flat pattern layout) | <ul style="list-style-type: none"> <li>• Structural member</li> </ul> |
|---|---|

**Achievement Criteria**

**Performance** The learner will be able to develop and layout an accurate 12' x 14' (3.6 m x 4.2 m) steel structural component for subsequent fabrication.

**Conditions** The learner will be given:

- Multiple drawing sets
- Materials
- Shop space
- Shop tools

**Criteria** The learner will be evaluated on the required offsets for component, including:

- Keel location
- Chine location
- Water lines
- Deck at side
- Deck at centre
- Deck camber
- Mitre angles
- Dead rise
- Datum lines
- Relevant marks
- Code and specification



**Line (GAC):**        **D    CREATE LOFTS**  
**Competency:**     **D1   Apply the lofting process**

**Objectives**

To be competent in this area, the individual must be able to:

- Identify the hull development process.

**LEARNING TASKS**

**CONTENT**

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Describe planning for the space requirements for lofting</li> <br/> <li>2. Describe the selection of tools and processes</li> <br/> <li>3. Describe a table of offsets</li> <br/> <li>4. Identify the principle views used in lofting</li> <br/> <li>5. Identify essential lofting lines</li> </ol> | <ul style="list-style-type: none"> <li>• Plan space for lofting</li> <li>• Scale</li> <li>• Working room</li> <li>• Lighting</li> <li>• Tool and equipment access</li> <li>• Light colour, smooth, flat floor</li> <li>• Large access doors</li> <br/> <li>• Three-sided scale</li> <li>• Various flexible battens</li> <li>• T-Square</li> <li>• Bevel square</li> <li>• Table of offsets</li> <li>• Scribe board</li> <li>• Faired curves</li> <br/> <li>• 3 dimensional coordinate system</li> <li>• Hull surface points (feet, inches and eighths)</li> <li>• Moulded line policy</li> <li>• Calculations</li> <br/> <li>• Profile</li> <li>• Half-breadth</li> <li>• Body line</li> <br/> <li>• Baseline</li> <li>• Stations</li> <li>• Waterlines</li> <li>• Profile</li> <li>• Rabbet</li> <li>• Buttock</li> <li>• Diagonal</li> <li>• Forward/aft perpendicular</li> </ul> |
|---|---|



**LEARNING TASKS**

6. Identify codes and specifications

**CONTENT**

- Fairing lines
- Accuracy
- Tolerances



**Line (GAC):**        **D    CREATE LOFTS**

**Competency:**      **D2    Develop an initial lines plan**

**Objectives**

To be competent in this area, the individual must be able to:

- Develop the essential lofted views for a vessel.
- Label all lines and points in the views.

**LEARNING TASKS**

1.    Apply a table of offsets
  
2.    Develop a profile plan
  
3.    Develop a half-breadth plan
  
4.    Develop body plan
  
5.    Label all lines and points in the views

**CONTENT**

- Hull surface points (feet, inches and eighths)
- Metric
- Imperial
- Scaled
- Moulded line
  
- Stations
- Keel
- Datum/baseline
- Forward perpendicular
- Aft perpendicular
- Mid-ships
- Water lines
- Rabbet
- Buttocks
  
- Stations
- Water lines
- Offsets
- Rabbet
- Diagonal
  
- Water lines
- Centre line
- Sheer line
- Rabbet
- Buttocks
- Diagonal
  
- Water lines
- Centre line
- Mid-ships
- Baseline
- Deck at side (D@S)



**LEARNING TASKS**

**CONTENT**

- Deck at centre line (D@CL)
- Rabbet
- Terminology

**Achievement Criteria**

**Performance** The learner will be able to develop the initial lines for a 50' (15.2 m) steel vessel.

**Conditions** The learner will be given:

- Drawings
- Table of offsets
- Loft space
- Equipment
- Materials

**Criteria** The learner will be evaluated on:

- Completion of the three essential views within a 24 hour period
- Accuracy within 1/16" (2 mm)
- Work safely and in a professional manner

**NOTE:** It is suggested that this is a paired task to achieve the drawing and fairing requirements.



**Line (GAC):        D    CREATE LOFTS**

**Competency:        D3    Refine an initial lines plan**

**Objectives**

To be competent in this area, the individual must be able to:

- Refine a hull form.
- Use applicable terminology.

**LEARNING TASKS**

1.    Apply frame locations
  
2.    Apply buttock locations
  
3.    Apply water line locations
  
4.    Develop refined lines
  
5.    Describe roll line

**CONTENT**

- Frame spacing
- Watertight bulkheads
- Collision bulkheads
  
- Standard spacing
- Complex geometry
  - Bow
  - Stern
  - Thruster locations
  - Through hulls
  - Sea chests
  
- Design water line (DWL)
- Deck locations
- Spacing
  
- Faired curves
- Flat spots
- Tangency
- Critical thinking
- Codes and standards
- Accuracy
- Neatness
  
- Direction
- Grain
- Transition
- Process
- Expansion/contraction
- Sweeps and patterns
- Tools and equipment



**Achievement Criteria**

Performance The learner will be able to develop a refined lines plan for a 50' (15.2 m) steel vessel.

Conditions The learner will be given:

- An initial lines plan
- Table of offsets
- Loft space
- Tools & materials
- 24 hours to complete task

Criteria The learner will be evaluated on:

- Faired hull form within standards specified from initial lines plan
  - Minimal flat spots
  - Consistent curves
  - Consistent intensity
  - Neat & concise
- Fully labelled points and profiles

**NOTE:** It is suggested that this is a paired task to achieve the drawing and fairing requirements. This is an extension to the previous lofting work.



**Line (GAC):        D    CREATE LOFTS**

**Competency:        D4    Proof a refined lines plan**

**Objectives**

To be competent in this area, the individual must be able to:

- Apply quality control to the lines plan.
- Determine construction dimensions for structural components.
- Develop profiles, patterns and templates.
- Use applicable terminology.

**LEARNING TASKS**

**CONTENT**

1.    Establish diagonals (quality control) in the body plan to confirm fairness	<ul style="list-style-type: none"> <li>• Plot profiles</li> </ul>
2.    Confirm finished fairness	<ul style="list-style-type: none"> <li>• Codes and standards</li> <li>• Critical thinking</li> <li>• Neatness</li> <li>• Accuracy</li> <li>• Application of corrections</li> </ul>
3.    Determine construction dimensions for structural components	<ul style="list-style-type: none"> <li>• Keel</li> <li>• Stem</li> <li>• Frame</li> <li>• Bulkhead</li> <li>• Stern frame</li> <li>• Girder</li> </ul>
4.    Develop various profiles	<ul style="list-style-type: none"> <li>• Keel</li> <li>• Stem</li> <li>• Frame</li> <li>• Bulkhead</li> <li>• Stern frame</li> <li>• Girder</li> </ul>
5.    Develop patterns and templates	<ul style="list-style-type: none"> <li>• Material</li> <li>• Scale</li> <li>• Keel</li> <li>• Stem</li> <li>• Frame</li> <li>• Bulkhead</li> <li>• Stern frame</li> <li>• Girder</li> </ul>

**Achievement Criteria**

**Performance** The learner will be able to construct an approximately 12' x 14' (3.6 m x 4.2 m) full-size template or pattern of a structural hull component.

**Conditions** The learner will be given:

- A proven lines plan
- Plywood/cardboard
- Suitable pattern stock
- Shop space
- Tools & materials
- 6 hours to complete task

**Criteria** The learner will be evaluated on:

- Accuracy of the finished patterns
- All required dimensions
- Check dimensions
- Correct labelling and reference information

**NOTE:** It is suggested that this is a paired task to achieve the drawing and fairing requirements. This is an extension to the previous lofting work.



**Line (GAC):**        **E    CONSTRUCT AND REPAIR SHIP STRUCTURES**  
**Competency:**      **E1    Use a jig in ship construction**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe principles and methods of jig design, construction and application in the shipbuilding and repair industry.

**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. Describe the purpose and function of jigs</li> <br/> <li>2. Identify types of jigs</li> <br/> <li>3. Describe the design and construction of jigs</li> </ol> | <ul style="list-style-type: none"> <li>• Accuracy control</li> <li>• Efficiency</li> <br/> <li>• Alignment</li> <li>• External</li> <li>• Internal</li> <li>• Pin</li> <li>• Modular</li> <li>• Incremental</li> <li>• Overlay</li> <br/> <li>• Tolerances</li> <li>• Terminology <ul style="list-style-type: none"> <li>○ Offset</li> <li>○ Sheer</li> <li>○ Camber</li> </ul> </li> <li>• Alignment</li> <li>• Construction process</li> <li>• Labelling</li> <li>• Materials</li> <li>• Types of fasteners</li> </ul> |
|--|--|



**Line (GAC): E CONSTRUCT AND REPAIR SHIP STRUCTURES**

**Competency: E2 Assemble ship structures**

**Objectives**

To be competent in this area, the individual must be able to:

- Construct ship structures.

**LEARNING TASKS**

**CONTENT**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Interpret blueprint</li> <br/> <li>2. Inspect components</li> <br/> <li>3. Apply initial quality control</li> <br/> <li>4. Assemble components</li> <br/> <li>5. Inspect after assembly</li> </ol> | <ul style="list-style-type: none"> <li>• Marine terminology</li> <li>• Hull form</li> <li>• Sequencing</li> <li>• Stages of fabrication</li> <br/> <li>• Material             <ul style="list-style-type: none"> <li>○ Steel</li> <li>○ Aluminum</li> <li>○ Stainless</li> <li>○ Heat numbers</li> <li>○ Grade</li> <li>○ Quantity</li> <li>○ Size</li> <li>○ Shape</li> </ul> </li> <br/> <li>• Layout</li> <li>• Points</li> <li>• Origins</li> <li>• Component number</li> <li>• Master datum</li> <li>• Deck number</li> <li>• Direction marks</li> <li>• Mitre</li> <li>• Bevel angles</li> <br/> <li>• Parts</li> <li>• Sub-assemblies</li> <li>• Weldments             <ul style="list-style-type: none"> <li>○ Weld procedures</li> <li>○ Weld allowances</li> <li>○ Weld preps</li> </ul> </li> <br/> <li>• Measurements</li> <li>• Distortion</li> <li>• Fit up</li> <li>• NDE (non-destructive examination)</li> </ul> |
|--|---|



## LEARNING TASKS

6. Apply reference marks

## CONTENT

- Bow thruster
- Plimsoll
- Water line
- Boot top marking
- Bulbous bow marking
- Frame locations
- Warning markings
- Keel markings

## Achievement Criteria

Performance	<p>The learner will be able to:</p> <ul style="list-style-type: none"> <li>• Develop and follow a work plan.</li> <li>• Build a block module 20' x 15' x 15' (6.1 m x 4.5 m x 4.5 m) comprised of ¼" (6 mm) steel plate material.</li> </ul>
Conditions	<p>The learner will be given:</p> <ul style="list-style-type: none"> <li>• Drawings</li> <li>• ¼" (6 mm) steel plate or thicker</li> <li>• Codes and standards (IACS)</li> <li>• Shop space</li> <li>• Shop tools and equipment</li> <li>• 30 hours to complete the task</li> </ul>
Criteria	<p>The learner will be evaluated on:</p> <ul style="list-style-type: none"> <li>• Safe use of material handling</li> <li>• Work safely and in a professional manner</li> <li>• Alignment</li> <li>• Fairness</li> <li>• Orientation</li> <li>• Fit up</li> <li>• Equipment useage</li> <li>• Application of drawings and standards</li> <li>• Work plan is followed</li> </ul>

**NOTE:** It is suggested that this is a paired task to achieve the drawing and fairing requirements. This is an extension to the previous lofting work.



**Line (GAC):** E **CONSTRUCT AND REPAIR SHIP STRUCTURES**  
**Competency:** E3 **Outfit ships**

**Objectives**

To be competent in this area, the individual must be able to:

- Accurately level, locate and align components to ship structure.
- Use applicable terminology.

**LEARNING TASKS**

1. Interpret blueprint
  
2. Select components
  
3. Layout components
  
4. Fit components

**CONTENT**

- Location
- Measurements
- Coordination with
  - Other trades
  - Other departments
  - Other drawings
  
- Types of components
  - Deck fittings
  - Electrical
  - Mechanical
  - Piping
  - Safety equipment
- Furnishings
  
- Reference lines
  - Baseline
  - Waterline
  - Centre line
  - Frame line
  
- Tools
  - Plumb bob
  - Declivity level
  - Builders' level
- Securing
  - Come-alongs
  - Turnbuckles
  - Fasteners
  - Clamps
  - Clips
  - Wedges
- Scribe
- Trim/green allowance
- Rigging
- Shoring and blocking



### LEARNING TASKS

5. Weld components
  
6. Apply quality control

### CONTENT

- Weld procedures
  - Weld allowances
  - Weld preps
  
- Alignment
- Level
- Plumb
- Datum location
- Orientation
- Codes and standards

### Achievement Criteria

Performance The learner will be able to locate, align and level outfitting components.

- Conditions The learner will be given:
- ¼" (6 mm) steel plate
  - Relevant drawings, codes and standards
  - Tools and equipment
  - Material handling equipment
  - 6 hours to install and QC

- Criteria The learner will be evaluated on:
- Safe use of material handling
  - Work safely and in a professional manner
  - Alignment
  - Fairness
  - Orientation
  - Fit up
  - Equipment useage
  - Application of drawings and standards
  - Work plan is followed
  - Weld symbols

**NOTE:** It is suggested that this is a paired task to achieve the drawing and fairing requirements. This is an extension to the previous lofting work.





**Line (GAC):** E **CONSTRUCT AND REPAIR SHIP STRUCTURES**  
**Competency:** E4 **Erect hull blocks**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe hull block assembly to complete ship construction.
- Describe quality control considerations.

**LEARNING TASKS**

**CONTENT**

- |  |   |
|--|---|
| <p>1. Describe drawing</p>   | <ul style="list-style-type: none"> <li>• Hull block drawing</li> <li>• Code allowances</li> <li>• Block erection sequence               <ul style="list-style-type: none"> <li>○ Block numbers</li> <li>○ Blocks</li> <li>○ Grand blocks</li> </ul> </li> </ul>   |
| <p>2. Describe block transport methods</p>                                       | <ul style="list-style-type: none"> <li>• Crane</li> <li>• Self-Propelled Modular Transporter (SPMT)</li> <li>• Lift plan               <ul style="list-style-type: none"> <li>○ Roles and responsibilities</li> <li>○ Lift route</li> <li>○ Lift points</li> <li>○ Rigging selection</li> <li>○ Communication</li> <li>○ Documentation</li> </ul> </li> </ul>                             |
| <p>3. Identify specific references for block size, orientation and placement</p> | <ul style="list-style-type: none"> <li>• Datums               <ul style="list-style-type: none"> <li>○ Base line</li> <li>○ Centre line</li> <li>○ Frame line</li> <li>○ Level line</li> <li>○ Water line</li> </ul> </li> <li>• Orientation reference               <ul style="list-style-type: none"> <li>○ Structure</li> <li>○ Geometry</li> </ul> </li> </ul>                        |
| <p>4. Describe fit up</p>  | <ul style="list-style-type: none"> <li>• Tools               <ul style="list-style-type: none"> <li>○ Plumb bob</li> <li>○ Builders' level</li> <li>○ Transit</li> </ul> </li> <li>• Securing and shoring               <ul style="list-style-type: none"> <li>○ Dunnage</li> <li>○ Blocking</li> <li>○ Come-alongs</li> <li>○ Turnbuckles</li> <li>○ Fairing aids</li> </ul> </li> </ul> |



**LEARNING TASKS**

**CONTENT**

- |                                      |  |
|--------------------------------------|--|
| <p>6. Describe weld process</p>      | <ul style="list-style-type: none"> <li>• Weld procedures             <ul style="list-style-type: none"> <li>○ Weld allowances</li> <li>○ Weld preps</li> </ul> </li> <li>• Welding sequence</li> <li>• Distortion controls</li> </ul>  |
| <p>7. Describe quality control</p>   | <ul style="list-style-type: none"> <li>• Alignment</li> <li>• Level</li> <li>• Plumb</li> <li>• Datum location</li> <li>• Orientation</li> <li>• Codes and standards</li> <li>• Documentation             <ul style="list-style-type: none"> <li>○ NDE</li> <li>○ Accuracy control reports</li> <li>○ Weigh blocks &amp; grand blocks</li> </ul> </li> </ul> |
| <p>8. Describe access and egress</p> | <ul style="list-style-type: none"> <li>• Ramps</li> <li>• Scaffolds</li> <li>• Controls</li> <li>• Barriers</li> <li>• Safety</li> </ul>   |



**Line (GAC): E CONSTRUCT AND REPAIR SHIP STRUCTURES**

**Competency: E5 Repair ship structures**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe the process for repairing ship structures.
- Explain quality control.

**LEARNING TASKS**

**CONTENT**

- |  |  |
|--|--|
| <p>1. Describe the process for determining the scope of repair</p> | <ul style="list-style-type: none"> <li>• Roles and responsibilities               <ul style="list-style-type: none"> <li>○ Customer                   <ul style="list-style-type: none"> <li>– Specifications</li> <li>– Drawings</li> </ul> </li> <li>○ Classification Societies                   <ul style="list-style-type: none"> <li>– Codes and standards</li> <li>– Inspection</li> </ul> </li> <li>○ Yard                   <ul style="list-style-type: none"> <li>– Work planning and estimation</li> <li>– Tool and equipment selection</li> <li>– Materials</li> <li>– Location hazards</li> </ul> </li> <li>▪ Ventilation</li> <li>▪ Access</li> <li>▪ Obstacles</li> <li>▪ Lock out requirements</li> <li>▪ Environmental issues</li> </ul> </li> <li>• Coordination</li> <li>• Terminology</li> </ul> |
| <p>2. Describe the dry docking process</p>                         | <ul style="list-style-type: none"> <li>• Preparation               <ul style="list-style-type: none"> <li>○ Dry dock layout</li> </ul> </li> <li>• Berthing plan               <ul style="list-style-type: none"> <li>○ Tide and current tables</li> <li>○ Facility</li> <li>○ Personnel</li> <li>○ Safety</li> <li>○ Communications</li> <li>○ Documentation</li> </ul> </li> <li>• Positioning               <ul style="list-style-type: none"> <li>○ Blocks</li> <li>○ Shores</li> <li>○ Leveling</li> <li>○ Line handling</li> <li>○ Capstan</li> </ul> </li> </ul>  |



**LEARNING TASKS**

3. Describe repair processes for a double bottom

**CONTENT**

- Work plan
  - Materials
  - Logistics
  - Prep staff
  - Equipment
  - Coordination
- Specifications
- Location hazards
  - Assessments
  - Ventilation
  - Access
  - Obstacles
  - Lock out requirements
  - Environmental issues
- Damaged structure removal
- Work points and datums
- Template
- Fabrication
- Inspection
- Rigging



# Section 4

## TRAINING PROVIDER STANDARDS



## Facility Requirements

**Note:** Facilities will vary by location. The classroom and shop dimensions and facilities listed below are ideal with the understanding that some flexibility may be required in order to make use of multi-purpose space or facilities shared with other training programs.

### Classroom Area

- Classroom (approx. 900 sq. ft. or 86 m<sup>2</sup>)
- Instructional media to include instructor's computer station, multimedia projector and screen and/or large screen monitor, flipchart and whiteboard

### Shop Area

- **Lofting area** appropriate for scaled down lofting projects: approximate area should be 4' x 8' (1.2 m x 2.4 m) for each work station per person plus sufficient space between stations for ease of movement. If possible an area of 1,600 sq. ft./110 m<sup>2</sup> (approx. 20' x 60' or 6.1 m x 18 m) would allow for some full scale lofting exercises.
- **Welding shop:** 800 sq. ft. (74 m<sup>2</sup>) (approx. 20' x 40' or 6.1 m x 12.2 m) with specialized safety systems appropriate to the equipment
- **Indoor workshop:** Approximately 200 sq. ft. (17.6 m<sup>2</sup>) per student, ideally with moveable lifting device (minimum 1 Tonne capacity)
- **Outdoor workshop:** 900 sq. ft. (86 m<sup>2</sup>) with 20' (6.1 m) overhead clearance. Space must be covered with sufficient power supply for tools and equipment.

### Student Facilities

- Change rooms and individual lockers

### Instructor's Office Space

- Approximately 150 sq. ft. (16 m<sup>2</sup>) per instructor, with a desk, chairs and materials storage/filing system

### Other

- Materials storage: Approximately 200 sq. ft. (17.6 m<sup>2</sup>) raw materials storage (may be outdoors)
- Tools storage: Approximately 20 sq. ft. (2.5 m<sup>2</sup>) per student – lockable (indoors)



## Tools and Equipment

### Shop Equipment and Tools

#### ***Safety Equipment***

- Respirators
- Fall arrest

#### ***Tools and Materials (required for lofting)***

- Three-sided scale
- Various flexible battens
- Bevel set
- Cage templates
- Soapstone
- Chalk line
- Scribe
- Marker
- Dividers

#### ***Cutting Tools and Equipment***

- Band saw
- Hand saw
- Jig saw
- Circular saw
- Cutting Torch
- Portable plasma cutter
- Cold cut saws
- Burning Table
- Ironworker
- Shear

#### ***Securing Equipment***

- Come-alongs
- Turnbuckles
- Fasteners
- Plate clamp

#### ***Welding Equipment***

- Oxy-acetylene
- Arc welding
- FCAW



- GMAW

#### ***Alignment Tools***

- Builder's level
- Laser transit
- Piano wire
- Straightedge
- Feeler gauges
- Tape measure
- Clinometer
- Plumb bob
- Hydraulic jacks
- Hammers and wedges
- Declivity level
- Turnbuckles
- Strongbacks
- Dogs
- Wedges

#### ***Metal Shaping Tools and Equipment***

- Rosebud Torch
- Brake press
- Male and female dies
- Rolls
- Weights
- Grinder
- Die grinder
- Radiograph
- Slab or pin jig



***Lifting Equipment***

- Overhead bridge span crane
- A-frame crane (mobile)
- Rigging equipment
  - Shackles
  - Slings
  - Chokers
  - Spreader beams
  - Plate clamps

**Student Equipment (supplied by school)*****Required***

- Face shield
- Leather aprons
- Dust masks
- Welding helmet
- Hearing protection
- Hand tools

**Student Tools (supplied by student)*****Required***

- Steel-toe workboots (CSA compliant)
- Gloves
- Eye protection

***Recommended***

- Close-fitting pants, shirts and jackets
- Coveralls



## Reference Materials

### Recommended Reference Materials

- Ship Knowledge – Covering Ship Design and Construction, 2<sup>nd</sup> Edition, K. van Dokkum; ISBN# 90-806330-6-2
- Ship Construction 6<sup>th</sup> Edition, D. J. Eyres; Butterworth-Heinemann, Oxford, UK, 2007



## Instructor Requirements

### Occupation Qualification

The instructor must possess:

- BC Marine Fitter Endorsement  
OR
- Metal Fabricator Certificate of Qualification or Boilermaker Certificate of Qualification with Red Seal Endorsement
  - Plus a minimum of 5 years of experience performing marine fitting work.

### Instructional Experience and Education

It is preferred that the instructor also possesses the following:

- Provincial (B.C.) Instructor Diploma or completion of a similar trainer training or instructional methods program
- Demonstrated ability to supervise the work of others
- Demonstrated effectiveness in communication skills - instructional and interpersonal
- Working knowledge of relevant software programs for:
  - Word processing
  - Spreadsheets
  - Presentations
  - CAD



# Appendices



## Appendix A: Glossary of Acronyms

<b>ABS:</b>	American Bureau of Shipping
<b>ASME:</b>	American Society of Mechanical Engineers
<b>BL:</b>	Baseline
<b>BV:</b>	Bureau Veritas
<b>CL:</b>	Centre line
<b>D@CL:</b>	Deck at centre line
<b>D@S:</b>	Desk at side
<b>DNV:</b>	Det Norske Veritas
<b>DWL:</b>	Design water line
<b>FLRA:</b>	Field level risk assessment
<b>IACS:</b>	International Association of Classification Societies
<b>ISO:</b>	International Organization for Standardization
<b>LOA:</b>	Length overall
<b>NDE:</b>	Non-destructive examination
<b>OSHA:</b>	Occupational Safety and Health Association
<b>PPE:</b>	Personal protective equipment
<b>PWBS:</b>	Product work breakdown structure
<b>Rad Haz:</b>	Radiation hazard
<b>SNAME:</b>	Society of Naval Architects and Marine Engineers
<b>SOP:</b>	Safe operating procedures
<b>SPMT:</b>	Self-propelled modular transporter
<b>SWP:</b>	Safe working practices
<b>WL:</b>	Water line



## Appendix B: Assessment Guidelines

### GRADING SHEET: SUBJECT COMPETENCY AND WEIGHTINGS

PROGRAM: IN-SCHOOL TRAINING:		MARINE FITTER ENDORSEMENT	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
A	UNDERSTAND THE SHIPBUILDING AND REPAIR INDUSTRY	15%	0%
B	DEMONSTRATE SAFE WORK PRACTICES	20%	25%
C	READ SHIP DRAWINGS	30%	25%
D	CREATE LOFTS	15%	25%
E	CONSTRUCT AND REPAIR SHIP STRUCTURES	20%	25%
	<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>In-school theory / practical subject competency weighting</b>		20%	80%
<b>Final in-school percentage score</b> Apprentices must achieve a minimum 70% as the final in-school percentage score to be eligible to write ITA Standardized exam		<b>IN-SCHOOL %</b>	

<b>ITA Standardized Written Exam Mark</b> A score of 70% or higher is required for a pass.	<b>EXAM%</b>
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**All apprentices who complete the optional Marine Fitter Endorsement with a FINAL level percentage score of 70% or greater will write the ITA Standardized examination as their final assessment.**