C2001-8
AIDS TO NAVIGATION– TECHNICIAN TRAINING
MAINTENANCE OF STEEL BUOYS

Edition 3.0
December 2021

urn:mrn:iala:pub:c2001-8:ed3.0
Revisions to this IALA Document are to be noted in the table prior to the issue of a revised document.

<table>
<thead>
<tr>
<th>Date</th>
<th>Page / Section Revised</th>
<th>Requirement for Revision</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2016</td>
<td>Entire document</td>
<td>Minor textual changes</td>
</tr>
<tr>
<td>December 2021</td>
<td>Entire document</td>
<td>Review of content</td>
</tr>
</tbody>
</table>
## CONTENTS

### PART 1 - COURSE OVERVIEW .................................................................................................................. 6
1. SCOPE .................................................................................................................................................. 6
2. OBJECTIVE ......................................................................................................................................... 6
3. COURSE OUTLINE .............................................................................................................................. 6
4. TEACHING MODULES ......................................................................................................................... 6
5. SPECIFIC COURSE RELATED TEACHING AIDS ............................................................................... 7
6. ACRONYMS ........................................................................................................................................... 7
7. Definitions ........................................................................................................................................... 7
8. REFERENCES ....................................................................................................................................... 7

### PART 2 – TEACHING MODULES .................................................................................................................. 8
1. MODULE 1 – HEALTH AND SAFETY ...................................................................................................... 8
   1.1. Scope ............................................................................................................................................... 8
   1.2. Learning Objective .......................................................................................................................... 8
   1.3. Syllabus .......................................................................................................................................... 8
      1.3.1. Lesson 1 - Health and Safety .................................................................................................. 8
2. MODULE 2 – TYPES OF STEEL BUOYS .................................................................................................. 8
   2.1. Scope ............................................................................................................................................... 8
   2.2. Learning Objective .......................................................................................................................... 8
   2.3. Syllabus .......................................................................................................................................... 8
      2.3.1. Lesson 1 - Types of Plastic Buoys .......................................................................................... 8
3. MODULE 3 – AFLOAT MAINTENANCE (See IALA WWA L2.1.8) .......................................................... 8
   3.1. Scope ............................................................................................................................................... 8
   3.2. Learning Objective .......................................................................................................................... 9
   3.3. Syllabus .......................................................................................................................................... 9
      3.3.1. Lesson 1 - Inspection ............................................................................................................. 9
      3.3.2. Lesson 2 - Maintenance ....................................................................................................... 9
4. MODULE 4 – ASHORE MAINTENANCE – DISMANTLING AND REBUILD ................................................. 9
   4.1. Scope ............................................................................................................................................... 9
   4.2. Learning Objective .......................................................................................................................... 9
   4.3. Syllabus .......................................................................................................................................... 9
      4.3.1. Lesson 1 - Dismantling .......................................................................................................... 9
      4.3.2. Lesson 2 - Coatings ............................................................................................................. 9
      4.3.3. Lesson 3 - Reassembly ....................................................................................................... 10
      4.3.4. Lesson 4 - Inspection .......................................................................................................... 10
      4.3.5. Lesson 5 - End of Life Disposal .......................................................................................... 10
5. MODULE 5 – STANDARDS ..................................................................................................................... 10
   5.1. Scope ............................................................................................................................................... 10
CONTENTS

5.2. Learning Objective ................................................................................................................................. 10
5.3. Syllabus .................................................................................................................................................. 10
  5.3.1. Lesson 1 - Standards ......................................................................................................................... 10

6. MODULE 6 – SITE VISIT..................................................................................................................... 10
  6.1. Scope...................................................................................................................................................... 10
  6.2. Learning Objective ................................................................................................................................. 11
  6.3. Syllabus .................................................................................................................................................. 11

List of Tables

Table 1  Levels of Competence .................................................................................................................... 6
Table 2  Table of Teaching Modules ........................................................................................................... 6
FOREWORD

The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) recognises that training in all aspects of Aids to Navigation (AtoN) service delivery, from inception through installation and maintenance to replacement or removal at the end of a planned life-cycle, is critical to the consistent provision of that AtoN service.

Taking into account that under the SOLAS Convention, Chapter 5, Regulation 13, paragraph 2; Contracting Governments, undertake to take into account the international recommendations and guidelines when establishing aids to navigation, including referring to the appropriate recommendations and guidelines of IALA. This includes recommendations on training and qualification of AtoN technicians, and consequently IALA has adopted Recommendation E-141 on Standards for Training and Certification of AtoN personnel.

IALA committees working closely with the IALA World-Wide Academy have developed a series of model courses for AtoN personnel having R0141 Level 2 technician responsibilities. This model course on the maintenance of steel buoys should be read in conjunction with the Training Overview Document IALA WWA C2000 which contains standard guidance for the conduct of all Level 2 model courses.

This model course is intended to provide national members and other appropriate authorities charged with the provision of AtoN services with specific guidance on the training of AtoN technicians in maintenance of steel buoys. Assistance in implementing this and other model courses may be obtained from the IALA World-Wide Academy at the following address:

The Dean
IALA World-Wide Academy
10 rue des Gaudines
78100 Saint Germain-en-Laye
France

Tel: (+) 33 1 34 51 70 01
Fax: (+) 33 1 34 51 82 05
e-mail: academy@iala-aism.org
Internet: www.iala-aism.org
PART 1 - COURSE OVERVIEW

1. SCOPE

This course is intended to provide technicians with the practical and theoretical training necessary to have a satisfactory understanding of the maintenance of steel buoys.

This introductory course is intended to be supported by further training modules on theoretical and practical aspects of floating aids to navigation (AtOn). Details of these supporting model courses can be found in the Level 2 Technician training overview document IALA WWA C2000.

2. OBJECTIVE

Upon successful completion of this course, participants will have acquired sufficient knowledge and skill to maintain steel buoys whilst on the job within their organisations.

3. COURSE OUTLINE

This practical course is intended to cover the knowledge required for a technician to maintain steel buoys under supervision. The complete course comprises five classroom modules, each of which deals with a specific subject covering aspects of steel buoy maintenance. Module six comprises a site visit designed to consolidate theoretical and practical knowledge. Each module begins by stating its scope and aims, and then provides a teaching syllabus.

The required standard of competence is considered to be the level of proficiency that should be achieved for the proper performance of the duties carried out by the technician in their organization.

This Model Course is focussed at the satisfactory level of competence.

<table>
<thead>
<tr>
<th>Competence Level</th>
<th>Learning Outcome</th>
<th>Instructional Objectives</th>
<th>Required skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>The conduct of routine tasks unsupervised and some more complex tasks under guidance</td>
<td>A <strong>satisfactory</strong> understanding of theoretical concepts and principles so that they can be applied in practice</td>
<td>Correctly acquired responses have become habitual. Actions can be performed confidently and efficiently</td>
</tr>
</tbody>
</table>

4. TEACHING MODULES

<table>
<thead>
<tr>
<th>Module Title</th>
<th>Time in hours</th>
<th>Overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health and Safety</td>
<td>1</td>
<td>This module identifies the health and safety issues associated with steel buoy maintenance</td>
</tr>
<tr>
<td>Types of steel Buoys</td>
<td>0.5</td>
<td>This module describes the types of steel buoys in common use</td>
</tr>
</tbody>
</table>
### Afloat Maintenance

| Afloat Maintenance | 1 | This module describes maintenance that can be carried out whilst buoy is on station |

### Ashore Maintenance – Dismantling/Rebuild

| Ashore Maintenance – Dismantling/Rebuild | 4 | This module describes the dismantling and rebuild of the buoy in the shore facility |

### Standards

| Standards | 0.5 | This module describes the international and local standards pertinent to steel buoys |

### Site visit

| Site visit | 4 | To visit a buoy refurbishment facility to consolidate knowledge learned |

**Total Hours:**  

| Total Hours: | 11 | 2 day course |

## 5. SPECIFIC COURSE RELATED TEACHING AIDS

This course involves both classroom instruction and a visit to a buoy refurbishment facility. Classrooms should be equipped with appropriate teaching aids to enable presentation of the subject matter.

## 6. ACRONYMS

To assist in the use of this model course, the following acronyms have been used:

- AtoN: Aid(s) to Navigation
- BS: British Standards
- EN: English
- IALA: International Association of Marine Aids to Navigation and Lighthouse Authorities
- ISO: International Organization for Standards
- MBS: IALA Maritime Buoyage System
- SOLAS: International Convention for the Safety of Life at Sea, 1974 (as amended)
- WWA: World Wide Academy

## 7. DEFINITIONS

The definition of terms used in this Model Course can be found in the International Dictionary of Marine Aids to Navigation (IALA Dictionary) at [http://www.iala-aism.org/wiki/dictionary](http://www.iala-aism.org/wiki/dictionary)

## 8. REFERENCES

The following material is relevant to this course:

1. IALA NAVGUIDE.
2. IALA Recommendation R1001 on the IALA Maritime Buoyage System (MBS).
3. IALA Recommendation R0108 on Surface Colours used as Visual Signals on Aids to Navigation.
4. IALA Guideline G1015 on Painting Aids to Navigation Buoys.
5. Technical documentation from coating suppliers.
PART 2 – TEACHING MODULES

1. MODULE 1 – HEALTH AND SAFETY

1.1. SCOPE

This module describes the health and safety issues associated with steel buoy maintenance.

1.2. LEARNING OBJECTIVE

To gain a satisfactory understanding of the health and safety issues associated with the maintenance of steel buoys.

1.3. SYLLABUS

1.3.1. LESSON 1 - HEALTH AND SAFETY

1. Personal Protective Equipment.
2. Use of mobile crane.
3. Control of heavy items being moved – buoy tipping and rolling.
4. Fork lift trucks.
5. High pressure water jet.
7. Spray painting.
8. Working at heights.
9. General hand tools.
10. Workplace risk assessment.

2. MODULE 2 – TYPES OF STEEL BUOYS

2.1. SCOPE

This module describes the types of steel buoys in common use.

2.2. LEARNING OBJECTIVE

To gain a satisfactory understanding of steel buoys in common use.

2.3. SYLLABUS

2.3.1. LESSON 1 - TYPES OF STEEL BUOYS

1. Tail tube buoys.
2. Skirted buoys.
3. Other types.

3. MODULE 3 – AFLOAT MAINTENANCE (See IALA WWA C2001-5 L2.1.8)

3.1. SCOPE
This module describes how steel buoys can be maintained afloat.

3.2. LEARNING OBJECTIVE

To gain a satisfactory understanding of how steel buoys can be maintained afloat.

3.3. SYLLABUS

3.3.1. LESSON 1 - INSPECTION
1 Review of cleaning – high pressure water/mechanical (scrapers).
2 Coating condition.
3 Mooring eye wear.
4 Damage inspection.

3.3.2. LESSON 2 – MAINTENANCE
1 Localised painting.
2 Marine growth and guano removal.
3 Mooring eye wear build up or mooring eye replacement.
4 Paint fade.

4. MODULE 4 – ASHORE MAINTENANCE – DISMANTLING AND REBUILD

4.1. SCOPE

This module describes the maintenance of steel buoys at a maintenance facility ashore.

4.2. LEARNING OBJECTIVE

To gain a satisfactory understanding of the maintenance of steel buoys at a shore facility.

4.3. SYLLABUS

4.3.1. LESSON 1 - DISMANTLING
1 Marine growth and guano removal.
2 Tail tube/ballast dismantling.
3 Superstructure removal and dismantling.
4 Mooring eye – inspection and repair.
5 Lifting eye testing.
6 Pressure testing.
7 Surface preparation:
   a Water jet.
   b Grit blast

4.3.2. LESSON 2 - COATINGS
1 Coating application:
   a Wet film thickness.
   b Dry film thickness.
2 Paint composition – pigments, binders, solvents, additives.
3 Paint types – alkyds, epoxies, polyurethanes, polysiloxanes, acrylated rubber, antifouling etc.
4 Galvanising/zinc spray
5 Cathodic protection

4.3.3. LESSON 3 - REASSEMBLY
1 Superstructure assembly.
2 Superstructure attachment.
3 Dissimilar metals and their isolation.
4 Solar unit attachment.
5 Bridle attachment.

4.3.4. LESSON 4 – INSPECTION AND TESTING
1 Final inspection prior to deployment:
   a Pressure testing
   b Mooring and/or lifting eye testing.

4.3.5. LESSON 5 - END OF LIFE DISPOSAL
1 Disposal plan for end of life.

5. MODULE 5 – STANDARDS

5.1. SCOPE
This module describes the standards pertinent to steel buoys.

5.2. LEARNING OBJECTIVE
To gain a satisfactory understanding of the standards pertinent to the maintenance of steel buoys.

5.3. SYLLABUS

5.3.1. LESSON 1 - STANDARDS
1IALA Recommendation R0108 on Surface Colours used as Visual Signals on Aids to Navigation.
2 Welding standards – e.g. BS EN 1011, BS EN ISO 5817.
3 Materials standard – e.g. BS EN 10025.
4 Spacing between different colours (colour breaks on Cardinal/Safe Water Marks etc.).
5 Surface preparation – e.g. BS EN ISO 8501.
6 Local standards.
7 Local standard operating procedures and record keeping

6. MODULE 6 – SITE VISIT

6.1. SCOPE
To visit a shore buoy maintenance facility.
6.2. **LEARNING OBJECTIVE**
To consolidate knowledge learned from this course.

6.3. **SYLLABUS**
Visit to a buoy maintenance facility or buoy tender to view the maintenance of steel buoys in operation.