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| IALA Recommendation |

R1001

The IALA Maritime Buoyage System AND OTHER MARINE AIDS TO NAVIGATION

Edition 2.0

Document date

Revisions to this IALA Document are to be noted in the table prior to the issue of a revised document.

|  |  |  |
| --- | --- | --- |
| Date | Page / Section Revised | Requirement for Revision |
| 16 June 2017 | 1st issue | Council session 64 |
| Xxxxxxxxxxxx | 2nd issue | Council session XX |
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THE IALA COUNCIL

**RECALLING**:

1. The function of IALA with respect to Safety of Navigation, the efficiency of maritime transport and the protection of the environment.
2. Article 8 of the IALA Constitution regarding the authority, duties and functions of the Council.
3. The ‘Agreement on the IALA Maritime Buoyage System’, signed in Paris on the 15th of April 1982 by accredited representatives of 53 nations or marine aids to navigation services to implement the IALA Maritime Buoyage System so initiating the harmonisation of maritime buoyage worldwide and that accredited representatives of other nations or marine aids to navigation services subsequently acceded to this agreement.
4. That the IALA Maritime Buoyage System described in the Agreement has been superseded by IALA Recommendation R1001 - IALA Maritime Buoyage System Edition 1.0 published June 2017.
5. That the International Convention on Safety of Life at Sea Chapter V Regulation 13 requires Contracting Governments to take into account the Recommendations and Guidelines of IALA, including the Maritime Buoyage System (IMO SN.1/Circ.297).

**RECOGNISING**:

1. That the current IALA Maritime Buoyage System has been adopted by almost all marine aids to navigation authorities worldwide.
2. That the United Nations Economic Commission for Europe has issued its Resolution No. 90 on 5th October 2018 adopting the principles of the maritime buoyage rules of IALA into its ‘European Code for Signs and Signals on Inland Waterways’.
3. That the IALA Standard S-1010 recognises the IALA Maritime Buoyage System as normative.

**CONSIDERING** the proposals of the IALA Aids to Navigation Requirements and Management Committee,

**ADOPTS** the Recommendation onthe IALA Maritime Buoyage System, *as described in the Annex*,

**INVITES** Members and marine aids to navigation authorities worldwide to implement the provisions of the Recommendation,

**RECOMMENDS** National members and other appropriate Authorities providing marine aids to navigation services comply with the IALA Recommendation R1001 version 2.0,

**REQUESTS** the *IALA Aids to Navigation Requirements and Management Committee or such other committee as the Council may direct* to keep the Recommendation under review and to propose amendments as necessary. Such amendments shall require General Assembly approval.

**ANNEX**

**TO**

**IALA RECOMMENDATION R1001**

**ON**

**THE IALA MARITIME BUOYAGE SYSTEM AND OTHER MARINE AIDS TO NAVIGATION**

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# INTRODUCTION

The IALA Maritime Buoyage System and other marine aids to navigation (AtoN), often referred to as MBS is a guide on marine aids to navigation markings. The purpose is to help all Mariners, navigating anywhere in the world, to fix their position and avoid dangers without fear of ambiguity. It is also to help competent maritime authorities to harmonize marine aids to navigation markings.

The MBS has served the maritime community well since its inception in the 1970s, worldwide consultation indicates that the fundamental principles of the MBS should be retained however it is reviewed in light of technological developments in the navigation environment.

IALA Recommendations and Guidelines provide information on planning, operating, managing, and implementing the marks authorized by the MBS and can be found via the IALA website at: [www.iala-aism.org](http://www.iala-aism.org)

## Regions A & B

The rules for System A, which included both cardinal and lateral marks, were completed in 1976 and agreed by the International Maritime Organization (IMO).

It was introduced in 1977 and its use has gradually spread throughout Europe, Australia, New Zealand, Africa, the Gulf and some Asian Countries.

There were previously more than thirty different buoyage systems in use world-wide, many of these systems having rules in complete conflict with one another.

It was thought necessary as a first step to define two main systems, one using the colour red to mark the port hand side of the channels and the other using the colour red to mark the starboard hand side of channels. These were called System A and System B, respectively.

The rules for System B were completed in early 1980. These were considered to be suitable for application in North, Central and South America, Japan, Republic of Korea and Philippines.

At a Conference convened by IALA in November 1980 with the assistance of IMO and the International Hydrographic Organization (IHO), Lighthouse Authorities from 50 countries and the representatives of nine International Organisations concerned with marine aids to navigation met, the two systems were so similar that IALA agreed to adopt a new combined system, known as “The IALA Maritime Buoyage System”.

This single set of rules allowed Lighthouse Authorities the choice of using red to port or red to starboard, on a regional basis; the two regions being known as Region A and Region B.

The boundaries of the buoyage regions were also decided and illustrated on a diagram annexed to the rules.

**Evolution of the MBS**

The most significant changes in the 2010 revision were the inclusion of marine aids to navigation other than the floating buoyage system. This is aimed at providing a more complete description of marine aids to navigation that may be used. This version includes the integration of electronic and mobile marks.

Historically the MBS referred solely to buoys; it should be noted that this document describes a system of “marks” that can be provided in a fixed or floating physical format or electronically, both stationary and mobile.

Future evolution will reflect the emerging shipping autonomy technologies which will impact on future AtoN provision.

**Unified and harmonized marking system**

Ideally, a unified marking arrangement is desirable worldwide, this can be achieved through adoption of common characteristics of marine aids to navigation in the respective Regions (A&B).

## General Principles of the System

The responsibility for safe navigation resides with the mariner, through the appropriate use of aids to navigation in conjunction with official nautical documents and prudent seamanship, including voyage planning as defined in IMO Resolutions. This booklet provides guidance on the Maritime Buoyage System and other aids to navigation for all users.

The IALA Aids to Navigation system has two components: The Maritime Buoyage System and other aids to navigation comprised of fixed and floating devices. This is primarily a physical system, however all of the marks may be complemented by electronic means.

Within the Maritime Buoyage System there are six types of marks, which may be used alone or in combination. The mariner can distinguish between these marks by identifiable characteristics. Lateral marks differ between Buoyage Regions A and B, as described below, whereas the other five types of marks are common to both regions.

There are four types of AtoN applications, such as:

Fixed

Floating

Mobile (MAtoN)

Electronic (AIS AtoN, radar target enhancer and radar beacon (racon))

Determining the proper application of a navigational mark / signal involves balancing the benefits derived from new and advancing technologies against safety and security concerns, the impact on the environment and on international trade facilitation, the potential costs to the industry, and finally their impact on personnel, both on board and ashore.

**Note**: The MBS does not consider other AtoN, such as radionavigation systems (GNSS or DGNSS) or Vessel Traffic Services (VTS) and the IALA NAVGUIDE and other relevant IALA Recommendations and Guidelines should be consulted in this regard.

## Method of characterising marks

A mark is characterised by one or more of the following features:

1. By night, colour and rhythm of light and/or illumination enhancement.
2. By day, colour, shape, top-mark, and/or light (including colour and rhythm).
3. By electronic (digital) symbology, e.g. as a complement to physical marks.
4. By electronic (digital) symbology solely

# DIFFERENT TYPE OF MARKS

## Lateral Marks

### Principles

There are two international Buoyage Regions A and B, where lateral marks differ. The current geographical divisions of these two Regions are shown on the world map on the centrefold of this booklet.

Following the sense of a “conventional direction of buoyage”, lateral marks in Region A utilize red and green colours (refer to section 2.1.3) by day and night to denote the port and starboard sides of channels respectively. However, in Region B (refer to section 2.1.4) these colours are reversed with red to starboard and green to port.

A modified lateral mark may be used at the point where a channel divides to distinguish the preferred channel, that is to say the primary route or channel that is so designated by the competent authority.

#### Definition of “conventional direction of buoyage**”**

The “conventional direction of buoyage”, which must be indicated in appropriate nautical charts and documents, may be either:

1. The general direction taken by the mariner when approaching a harbour, river, estuary or other waterway from seaward, or
2. The direction determined by the proper authority in consultation, where appropriate, with neighbouring countries. In principle, it should follow a clockwise direction around land masses.

### General Rules

#### Colour

The colour of lateral marks must comply with the IALA MBS Regions as specified in Sections 2.1.3 and 2.1.4.

#### Shapes

Lateral marks should be of cylindrical and conical shape. However, where they do not rely on a distinctive shape for identification, they should, where practicable, carry the appropriate topmark.

#### Topmarks

Conical topmarks (for lateral and cardinal marks)

1. The vertical height of a cone from base to apex should be about 90% of the base diameter.
2. For cardinal marks, the separation distance between cones should be about 50% of the base diameter of the cone.
3. The vertical clear space between the lowest point of the topmark and all other parts of the mark should be at least 35% of the base diameter of the cone.
4. The base diameter should be 25%-30% of the diameter of the buoy at the waterline.

Cylindrical (can) topmarks (for lateral marks)

1. The vertical height of a cylinder should be one (1) to 1.5 times the base diameter.
2. The vertical clear space between the lowest part of the cylinder and all other parts of the mark should be at least 35% of the diameter of the cylinder.
3. In the case of a buoy, the base diameter of the cylinder should be 25%-30% of the diameter of the buoy at the waterline.

Spherical topmarks (for isolated danger and safe water marks)

(a) In the case of a buoy, the diameter of the sphere(s) should be at least 20% of the diameter of the buoy at the waterline.

(b) For isolated danger marks the separation distance between spheres should be about 50% of their diameter.

(c) The vertical space between the lowest part of the sphere(s) and all other parts of the mark should be at least 35% of the diameter of the sphere(s).

‘X’ (Single 3-D Yellow Diagonal Cross) topmarks (for special marks)

The arms of the ‘X’ should be diagonally contained within a square with length of side of about 33% of the buoy diameter at the waterline. The width of the arms of the ‘X’ should be about 15% of the length of side of the square.

#### Numbering or lettering

If marks at the sides of a channel are numbered or lettered, the numbering or lettering shall follow the “conventional direction of buoyage” i.e. numbered from seaward. The protocol for numbering lateral marks, especially in confined waterways, should be “even numbers on red ~ odd numbers on green”.

### Description of Lateral Marks used in Region A

1. Description of Lateral Marks used in Region A

|  |  |  |
| --- | --- | --- |
|  | Port Hand Marks | Starboard Hand Marks |
| **Colour** | Red | Green |
| **Shape of buoy** | Cylindrical (can), pillar or spar | Conical, pillar or spar |
| **Topmark (if any)** | Single red cylinder (can) | Single green cone, point upward |
| **Light (when fitted)** | | |
| **Colour** | Red | Green |
| **Rhythm** | Any, other than that described in section 2.1.4. | Any, other than that described in section 2.1.4. |
| **Supplementary (if any)** | AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21)) | AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21) |
| Racon | Racon |

#### Visual depiction



1. Lateral Marks used in Region A

### Description of Lateral Marks used in Region B

1. Description of Lateral Marks used in Region A

|  | Port Hand Marks | Starboard Hand Marks |
| --- | --- | --- |
| **Colour** | Green | Red |
| **Shape of buoy** | Cylindrical (can), pillar or spar | Conical, pillar or spar |
| **Topmark (if any)** | Single green cylinder (can) | Single red cone, point upward |
| **Light (when fitted)** | | |
| **Colour** | Green | Red |
| **Rhythm** | Any, other than that described in section 2.1.5. | Any, other than that described in section 2.1.5. |
| **Supplementary (if any)** | AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21) | AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21) |
| Racon | Racon |

#### Visual depiction



1. Lateral Marks used in Region A

### Preferred Channel Marks

In Region A, at the point where a channel divides, when proceeding in the “conventional direction of buoyage,” a preferred channel may be indicated by a modified Port or Starboard lateral mark as follows:

1. Description Preferred Channel Marks used in Region A

|  |  |  |
| --- | --- | --- |
|  | Preferred channel to Starboard | Preferred channel to Port |
| **Colour** | Red with one broad green horizontal band | Green with one broad red horizontal band |
| **Shape of buoy** | Cylindrical (can), pillar or spar | Conical, pillar or spar |
| **Topmark (if any)** | Single red cylinder (can) | Single green cone, point upward |
| **Light (when fitted)** | | |
| **Colour** | Red | Green |
| **Rhythm** | Composite group flashing (2 + 1) | Composite group flashing (2 + 1) |
| **Supplementary (if any)** | AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21) | AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21) |
| Racon | Racon |

#### Visual depiction



1. Preferred Channel Marks used in Region A

In region B, at the point where a channel divides, when proceeding in the “conventional direction of buoyage,” a preferred channel may be indicated by a modified Port or Starboard lateral mark as follows:

1. Description of Preferred Channel Marks used in Region B

|  |  |  |
| --- | --- | --- |
|  | Preferred channel to Starboard | Preferred channel to Port |
| **Colour** | Green with one broad red horizontal band | Red with one broad green horizontal band |
| **Shape of buoy** | Cylindrical (can), pillar or spar | Conical, pillar or spar |
| **Topmark (if any)** | Single green cylinder (can) | Single red cone, point upward |
| **Light (when fitted)** | | |
| **Colour** | Green | Red |
| **Rhythm** | Composite group flashing (2 + 1) | Composite group flashing (2 + 1) |
| **Supplementary (if any)** | AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21) | AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21) |
| Racon | Racon |

#### Visual depiction



1. Preferred Channel Marks used in Region B

## Cardinal Marks

### Principles

Cardinal marks indicate where safer water in the area lies, in relation to a “point of interest”. For example, safer navigable water lies to the North of a North Cardinal Mark, but may also have navigable water East and West of it; the relevant chart should be consulted for further guidance.

Cardinal Marks do not have a distinctive shape but are normally pillar or spar. They are always painted in yellow and black horizontal bands and their distinctive double cone topmarks are always black. It should be noted that when the use of topmarks are impractical in ice conditions, a competent authority may decide topmarks are not to be used.

#### Numbering or lettering

Numbering or lettering to identify the mark or the “point of interest”, may be used.

#### Definition of Cardinal quadrants and marks

The four quadrants (North, East, South and West) are bounded by the true bearings NW-NE, NE-SE, SE-SW, and SW-NW, taken from the “point of interest”.

1. The type of Cardinal Mark indicates which side of the mark it should be passed by.
2. The Cardinal Marks in Region A and Region B, and their use, are the same.

### Rules

The type of Cardinal Mark is indicated by both topmark and coloured bands.

Cardinal Marks also have a defined system of flashing white lights. The rhythms are basically all “very quick” (VQ) or “quick” (Q) flashing but each type of mark uses a different sequence. “Very quick flashing” is defined as a light flashing at a rate of either 120 or 100 flashes per minute; “quick flashing” is a light flashing at either 60 or 50 flashes per minute.

**Note:** When similar Cardinal Marks are used in close proximity, dissimilar characters should be used.

The concept of three, six or nine flashes is easily remembered when one associates it with a clock face. The long flash, defined as a light appearance of not less than 2 seconds, is to ensure that three or nine very quick or quick flashes cannot be mistaken for six.

It will be observed that two other marks use white lights; Isolated Danger Marks and Safe Water Marks. Each has a distinctive light rhythm that cannot be confused with the very quick or quick flashing light of Cardinal Marks.

### Use of Cardinal Marks

A Cardinal Mark may be used, for example:

1. To indicate where the deepest water in that area can be found.
2. To indicate the safe side on which to pass a danger.
3. To draw attention to a feature in a channel such as a bend, a junction, a bifurcation or the end of a shoal.

Competent authorities should consider carefully before establishing too many Cardinal Marks in a waterway, or area, as this can lead to confusion, given their white lights of similar characteristics.

### Description of Cardinal Marks

1. Description of North and East Cardinal Marks

|  |  |  |
| --- | --- | --- |
|  | NorthCardinal Mark | EastCardinal Mark |
| **Topmark (a)** | 2 black cones, one above the other, points upward | 2 lack cones, one above the other, base to base |
| **Colour** | Black above yellow | Black with a single broad horizontal yellow band |
| **Shape of buoys** | Pillar or spar | Pillar or spar |
| **Light (when fitted)** | | |
| **Colour** | White | White |
| **Rhythm** | VQ or Q | VQ(3) every 5s or Q(3) every 10s |
| **Supplementary (if any)** | AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21) | AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21) |
| Racon | Racon |

1. Description of South and West Cardinal Marks

|  |  |  |
| --- | --- | --- |
|  | South Cardinal Mark | West Cardinal Mark |
| **Topmark (a)** | 2 black cones, one above the other, points downward | 2 black cones, one above the other, point to point |
| **Colour** | Yellow above black | Yellow with a single broad horizontal black band |
| **Shape of buoys** | Pillar or spar | Pillar or spar |
| **Light (when fitted)** | | |
| **Colour** | White | White |
| **Rhythm** | VQ(6) + Long flash every 10s or Q(6) + Long flash every 15s | VQ(9) every 10s or Q(9) every 15s |
| **Supplementary (if any)** | AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21) | AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21) |
| Racon | Racon |

Note (a): The double cone topmark is a very important feature of every Cardinal Mark by day, and should be used wherever practicable and be as large as possible with a clear separation between the cones.

### Visual depiction



1. Visual depiction of Cardinal Marks

## ISOLATED DANGER MARK

### Principles

The Isolated Danger Mark is placed on, or near to a danger that has navigable water all around it. Because the extent of the danger and the safe passing distance cannot be specified for all circumstances in which this mark may be used, the mariner shall consult the relevant charts and nautical publications for guidance.

Isolated Danger Marks do not have a distinctive shape but are normally pillar or spar. They are always painted black with one or more horizontal red bands. Distinctive double black spherical topmarks and Group flashing (2) white lights, serve to distinguish Isolated Danger Marks from Cardinal Marks.

#### Numbering or lettering

Numbering or lettering to identify the mark may be used.

### Rules

#### Definition of Isolated Danger Marks

An Isolated Danger Mark is a mark erected on, or moored on or above, an isolated danger which has navigable water all around it.

#### Description of Isolated Danger Marks

1. Description of a Danger Mark

|  |  |
| --- | --- |
| **Description** | |
| **Top-mark (b)** | Two black spheres, one above the other |
| **Colour** | Black with one or more broad horizontal red bands |
| **Shape of buoy** | Optional, but not conflicting with lateral marks; pillar or spar preferred |
| **Light (when fitted)** | |
| **Colour** | White |
| **Rhythm** | Group flashing (2) |
| **Supplementary (if any)** | AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21) |
| Racon |

**Note (b)**: The double sphere topmark is a very important feature of every Isolated Danger mark by day, and should be used wherever practicable and be as large as possible with a clear separation between the spheres.

### Visual depiction



1. Visual depiction of a Danger Mark

## SAFE WATER MARK

### Principles

The Safe Water Mark has navigable water all around it, and does not mark a danger. Safe Water Marks can be used, for example, as fairway, mid-channel or landfall marks.

Safe Water Marks have an appearance different from Danger Marking buoys. They are spherical, or alternatively pillar or spar, with red and white vertical stripes and a single red spherical top-mark.

#### Numbering or lettering

Numbering or lettering to identify the mark may be used.

### Rules

#### Definition of Safe Water Marks

Safe Water Marks serve to indicate that there is navigable water all around the mark. These include centre line marks and mid-channel marks. Such a mark may also be used to indicate channel entrance, port or estuary approach, landfall, or best point of passage under bridges.

#### Description of Safe Water Marks

1. Description of s Safe Water Mark

|  |  |  |
| --- | --- | --- |
| **Description** | | |
| **Colour** | Red and white vertical stripes |
| **Shape of buoy** | Spherical; pillar or spar with spherical topmark |
| **Top-mark (if any)** | Single red sphere |
| **Light (when fitted)** | | |
| **Colour** | White |
| **Rhythm** | Isophase, occulting, one long flash every 10s or Morse “A” (● -) |
| **Supplementary (if any)** | AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21) |
| Racon |

### Visual depiction



1. Visual depiction of a Safe Water Mark

## SPECIAL MARKS

### Principles

Special Marks are used to indicate a special area or feature whose nature may be apparent from reference to a chart or other nautical publication. They are not generally intended to mark channels or obstructions where the MBS provides suitable alternatives.

#### Numbering, lettering and or pictograms

Special Marks may be lettered or numbered, and may also include the use of a pictogram to indicate their purpose using International Hydrographic Organization (IHO) symbology where appropriate. IALA Guideline G1122 refers.

### Rules

#### Definition of Special Marks

Special Marks are yellow. They may carry a yellow “X” topmark, preferably three-dimensional so as to be visible from all directions, and any light used is also yellow. To avoid the possibility of confusion between yellow and white in poor visibility, the yellow lights of Special Marks do not have any of the rhythms used for white lights.

Their shape will not conflict with that of navigational marks. This means, for example, that a Special Mark located on the port hand side of a channel may be cylindrical, but will not be conical.

#### Mobile AtoN (MAtoN)

A Special Mark may also be utilised as a Mobile Aid to Navigation in which a mark is attached to floating objects which may be a collision hazard. A MAtoN has a defined light characteristic of three flickering flashes, followed by two regular flashes. It should be noted that Recommendation R1016 - Mobile Aids to Navigation (MAtoN) recommends that IALA members and relevant authorities to liaise and cooperate with Vessel Traffic Services (VTS) Authorities before a MAtoN is deployed in a VTS area. Refer to IALA Guideline XXX on the use of MAtoN.

Special Marks are used to indicate a special area or feature whose nature may be apparent from reference to a chart or other nautical publication. They are not generally intended to mark channels or obstructions where other marks are more suitable.

Some examples of uses of Special Marks:

1. Ocean Data Acquisition Systems (ODAS) marks
2. Traffic separation marks where use of conventional channel marking may cause confusion
3. Spoil Ground marks
4. Military exercise zone marks
5. Cable or pipeline marks
6. Recreation zone marks
7. Boundaries of anchorage areas
8. Structures such as offshore renewable energy installations
9. Aquaculture
10. Mooring buoys. These buoys are not usually considered to be aids to navigation, although larger moorings are often charted features. If it is considered necessary to increase their conspicuity (e.g. in or immediately adjacent to a channel), they should be marked as a special mark, however the use of a topmark may not be practical and measures should be taken to protect any light.
11. Moving object / hazard (MAtoN)

#### Special Channels

An important application for Special Marks is to mark a channel of interest to a particular class of vessel, for example, a specially dredged channel for deep draught vessels in an area where there already is adequate depth of water for most vessels. In such a case, the limit of safe navigation for vessels generally will continue to be marked by lateral (or cardinal) marks but the channel of special interest will be indicated by special marks with the appropriate daymark shape.

#### Description of Special Marks

1. Description of Lateral Marks used in Region A

|  |  |
| --- | --- |
|  | **Description** |
| **Colour** | Yellow |
| **Shape of buoy** | Optional, but not conflicting with lateral marks |
| **Top-mark (if any)** | Single yellow “X” shape |
| Light (when fitted) | |
| **Colour** | Yellow |
| **Normal Special Mark Rhythm** | Any, other than those reserved for cardinal, isolated danger and safe water marks. |
| **Rhythm** | Flicker 1s (5 Hz) Eclipse 0.7s Flicker 1s (5Hz) Eclipse 0.5s Fl 1s Eclipse 0.5s Fl 1s Eclipse 3s. |
| **Pictogram** | The use of pictograms is authorised, as defined by a competent authority. |
| **Supplementary (if any)** | When marking a moving object / hazard, use as MAtoN (mobile AtoN) |
| AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21) |
| Racon |

#### Description of MAtoN

1. Description of a MAtoN

|  | **Description** |
| --- | --- |
| **Colour** | Yellow |
| **Shape of buoy** | Optional, but not conflicting with lateral marks |
| **Top-mark (if any)** | Single yellow “X” shape  *To increase conspicuity, and if practical, the top mark of a special mark should be used* |
| **Additional marks** | For hazards with low profile/partly submerged and where visual observations are primarily undertaken from the air, an additional mark, like a circular symbol, can be added, if practicable. |
| **Position sensor** | If AIS is used, the Electronic Position Fixing System (EPFS) in use, must be in accordance with the latest version of ITU-R M.1371 - Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile frequency band. |
| **Light (when fitted)** | |
| **Colour** | Yellow |
| **MAton Rhythm** | Flicker 1s (5 Hz) Eclipse 0.7s Flicker 1s (5Hz) Eclipse 0.5s Fl 1s Eclipse 0.5s Fl 1s Eclipse 3s. |
| **Supplementary (if any)** | Radar reflectors - to increase radar conspicuity, and if practical, a radar reflector should be installed. |
| Reflective markings, if any, should be in accordance with IALA Recommendation R0106 - Retroreflecting Material on Aids to Navigation Marks Within the IALA Maritime Buoyage System |
| AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21) |
| Racon |

### Visual depiction



1. Visual depiction of a Special Mark

## EMERGENCY WRECK MARK

### Principles

New Dangers may be marked with an Emergency Wreck Mark.

### Rules

An Emergency Wreck Mark has blue and yellow vertical stripes in equal number, with a vertical/perpendicular yellow cross top-mark, preferably three-dimensional so as to be visible from all directions, and displays a blue and yellow alternating light.

#### Description of Emergency Wreck Mark

1. Description of an Emergency Wreck Mark

|  | **Description** |
| --- | --- |
| **Colour** | Blue/Yellow vertical stripes in equal number dimensions (minimum 4 stripes and maximum 8) |
| **Shape of buoy** | Pillar or spar |
| **Top-mark (if any)** | Vertical/perpendicular Yellow cross |
| **Light** | |
| **Colour** | Yellow/blue alternating |
| **Rhythm** | One second of blue light and one second of yellow light with 0.5 sec. of darkness between |
| **Supplementary (if any)** | AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21) |
| Virtual and / or synthetic AIS |
| Racon, displaying Morse Code “D” |

### Visual depiction



1. Visual depiction of an Emergency Wreck Mark

## OTHER MARKS

### Lighthouses

#### Definition of a Lighthouse

A lighthouse is a tower, or substantial building or structure, erected at a designated geographical location to carry a signal light and provides a significant daymark. It provides a long or medium range light for identification by night.

#### Description of a Lighthouse

A lighthouse is a structure that may provide a daymark for identification by day and a light at night. It may provide a platform for other AtoN such as a Differential Global Positioning System (DGNSS), racon or AIS as an Aids to Navigation to assist marine navigation.

A sector light may also be incorporated into the structure.

The structure may be illuminated at night to assist identification, IALA Guideline 1061 refers.

1. Description of a Lighthouse

|  |  |
| --- | --- |
|  | **Description** |
| **Colour/Shape** | Lighthouse structures can be of any colour, shape, or material generally designed to provide a distinctive daymark. |
| **Light** | |
| **Colour** | White, Red, or Green |
| **Rhythm** | Any number of flashes, isophase or occulting or as appropriate, to allow light to be readily identifiable. |
| **Supplementary (if any)** | AIS AtoN |
| Racon |

#### Visual depiction



1. Visual depiction of a Lighthouse

### Leading Lines/Ranges

#### Definition of Leading Lines/Ranges

A group of two or more marks or lights, in the same vertical plane such that the navigator can follow the leading line on the same bearing.

#### Description of Leading Lines

Leading Line structures can be any colour or shape that provides a distinctive mark that cannot be confused with adjacent structures.

1. Description of Leading Line/Ranges

|  |  |
| --- | --- |
| **Description** | |
| **Colour** | No colour significance. Competent authority determines the optimum colours to contrast with the dominant background colour at the location |
| **Shape** | No shape significance. Rectangular or triangular figures are recommended. |
| **Light (when fitted)** | |
| **Colour** | Any colour. Competent authority determines the optimum colour to contrast with the dominant back ground colour at the location. |
| **Rhythm** | Any, however fixed characteristics should be used sparingly and the use of synchronisation can assist in the overcoming background light. |
| **Supplementary (if any)** | AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21) |
| Racon |

#### Visual depiction



1. Visual depiction of a Leading Line / Ranges

### Sector Lights

#### Definition of Sector Lights

A sector light is a fixed aid to navigation that displays a light of different colours and/or rhythms over designated arcs. The colour of the light provides directional information to the mariner.

#### Description of Sector Lights

A sector light may be used:

1. To provide directional information in a fairway;
2. To indicate a turning point, a junction with other channels, a hazard or other items of navigational importance;
3. To provide information on hazard areas that should be avoided;
4. In some cases a single directional light may be used.
5. Description of a Sector Light

|  | **Description** |
| --- | --- |
| **Colour** | Not applicable |
| **Shape** | None, light only |
| **Light** | |
| **Colour** | If using to mark channel limits follow convention for IALA region indicated in Section 2.1. Lights may have oscillating boundaries |
| **Rhythm** | As appropriate |
| **Supplementary (if any)** | AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21) |
| Racon |

#### Visual depiction



1. Visual depiction of a Sector Light

### Beacons

#### Definition of a Beacon

A fixed man-made navigation mark that can be recognised by its shape, colour, pattern, topmark, or light character, or a combination of these.

#### Description of a Beacon

1. Can carry a signal light and in this case is termed a light beacon or lighted beacon;
2. If not fitted with a light it is termed an unlighted or unlit beacon and provides only a day mark;
3. As a leading line/range or conspicuous radar mark;
4. Description of a Beacon

|  |  |
| --- | --- |
|  | **Description** |
| **Colour** | Any |
| **Shape** | As appropriate, including cardinal mark |
| **Topmark (if any)** | As appropriate |
| **Light (when fitted)** | |
| **Colour** | White, Red, or Green |
| **Rhythm** | As appropriate |
| **Supplementary (if any)** | AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21) |
| Racon |

### Major Floating Aids

#### Definition of Major Floating Aids

Major floating aids include lightvessels, light floats and large navigational buoys.

#### Description of Major Floating Aids

Major floating aids are generally deployed at critical locations, intended to mark approaches from offshore areas, where shipping traffic concentrations are high. They may provide a platform for other Aids to Navigation such as racons or AIS AtoN to assist marine navigation.

#### Visual depiction



1. Visual depiction of a Major Floating Aid (Lightship)

#### Supplementary (if any)

1. AIS AtoN (Add type of Mark as per the coding from Table 74 of the ITU standard for message type 21)
2. Racon

### Auxiliary Marks

#### Definition of Auxiliary Marks

Minor aids that have not been previously described.

#### Description of Auxiliary Marks

These marks are usually outside of defined channels and generally do not indicate the port and starboard sides of the route to be followed or obstructions to be avoided.

They also include those marks used to convey information related to navigation safety. These marks shall not conflict with other navigational marks and shall be promulgated in appropriate nautical charts and documents. They should not generally be used if a more appropriate mark is available within the MBS.

#### Visual depiction



1. Visual depiction of an Auxiliary Mark

# DIFFERENT TYPE OF MARKS

## APPLICATION OF THE DIFFERENT TYPES OF MARK

The table below indicates the application of the various types of Mark:

1. Application of different types of marks

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Type of Mark** | **Physical Mark (may include AIS AtoN)** | **Virtual (AIS)** | **Synthetic (AIS)** | **MAtoN** | **Racon** | **New Danger** | **Numbering & Lettering** | **Pictograms** |
| Lateral | X | X | X |  | X | X | X |  |
| Cardinal | X | X | X |  | X | X | X |  |
| Isolated Danger | X | X | X |  | X | X | X |  |
| Safe Water | X | X | X |  | X |  | X |  |
| Special | X | X | X | X | X |  | X | X |
| Emergency Wreck | X | X | X |  | X | X | X |  |

## OTHER CONSIDERATIONS

### AIS AtoN

An AIS AtoN can be implemented in three ways, Physical, Synthetic, and Virtual. Recommendation A-126 – Use of the Automatic Identification Systems (AIS) in Marine Aids to Navigation Services refers.

A Real AIS AtoN Station is an AIS station located on an AtoN that physically exists.

A Synthetic AIS AtoN is transmitted from an AIS base station or transponder located remotely from the AtoN.

A ‘Virtual AIS AtoN’ is transmitted from an AIS base station or transponder for an AtoN that does not physically exist. When a Virtual AIS AtoN is used, the AtoN symbol or information would be available for presentation to a mariner on Electronic Nautical Chart (ENC)/ECDIS, even though there is no real AtoN such as a buoy or beacon. For Virtual AIS AtoN reference should be made to IALA Recommendation O-143, and to IALA Guideline 1081.

### Marking of New Dangers

New Dangers are newly discovered hazards, natural or man-made, that may not yet be shown in nautical documents and publications. They will remain a hazard until the competent Authority is satisfied that the danger has been removed, or until the hazard information is sufficiently promulgated.

New Dangers should be appropriately marked using Lateral, Cardinal, Isolated Danger Marks or by using the Emergency Wreck Marking Buoy. If the Authority considers the risk to navigation to be especially high, at least one of the marks should be duplicated.

1. If using a Lateral lighted mark for this purpose a VQ or Q light character shall be used.
2. Any duplicate mark shall be identical to its partner in all respects.
3. In addition it may be marked by a Racon, coded Morse “D”(- ● ●)
4. In addition it may be marked by other electronic means, such as automatic identification system (AIS AtoN).

### Port, Harbour, Inland Waterway and other Local Marks

Port, Harbour, Inland Waterway and other local Marks should comply with the MBS wherever possible, in order that mariners can achieve a seamless transition between different areas.

Breakwaters are usually marked using a combination of lateral marks, and in many cases, a set of lead-in and/or a sector light to assist approaching vessels in navigating between breakwaters. In those instances where both “above water”, partially or wholly submerged breakwaters present a hazard to navigation**,** a small network of special marks (fixed and/or floating) spaced at an equal distance apart, could provide an appropriate and recognised means of marking these hazards.

The unlit portion of the breakwater (in between AtoN) could present a hazard to navigation for mariners. Pathway, or street lighting could be considered to provide a non-conventional means to maximize the area illuminated of a breakwater, thus increasing safety for the mariner (refer to IALA Recommendation O-139 Marking of Man-Made Offshore Structures and IALA Guideline G1078. The use of AtoN in the design of fairways).

It is noted that the United Nations Economic Commission for Europe has adopted the principles of the IALA AtoN system as a basis, where applicable to inland waters, into its ”European Code for Signs and Signals on Inland Waterways” (<https://www.unece.org/fileadmin/DAM/trans/main/sc3/publications/SIGNI_2019_e.pdf>). SIGNI provides recommendations for the competent authorities for the installation and application of buoyage and marking on European inland waterways and its provisions have been defined in such a way as to avoid, as far as possible, any risk of conflict or confusion between the two systems (IALA MBS and SIGNI) of buoyage.

However, mariners should be careful to take account of any local marking measures that may be in place and will often be covered by Local Regulations or by-laws. The boundaries between inland waterways (to which SIGNI applies) and maritime waterways, are determined by the competent authorities.

Before transiting an area for the first time, mariners should make themselves aware of local marking arrangements.

Local Aids to Navigation may include, but not be restricted to, marking of:

1. breakwaters, quays and jetties; leisure areas
2. bridges (IALA Recommendation O-113 The Marking of Fixed Bridges Over Navigable Waters refers)
3. traffic signals (IALA Recommendation R0111 Port Traffic Signals refers)
4. other river, channel, canal, lock and waterways marked within the responsibilities of competent authorities.

### Synchronisation of lights

If appropriate, synchronised lights (all flashing at the same time) or sequential lights (flashing one after another) or a combination of both may be utilized. IALA Guideline G1116 Selection of Rhythmic Characters and Synchronisation of Lights for Aids to Navigation refers.

### Retro-reflecting materials

The use of retroreflecting material on aids to navigation is becoming increasingly widespread particularly in the case of unlighted aids where the projection of a light by a user, (which may range from a hand‐held spotlight to a powerful searchlight), can assist to locate an aid and enhance identification of that aid.

Some Authorities require only a method (the Standard Code) whereby an aid can be detected with a degree of identification, especially for lateral marks. Others, such as the Scandinavian countries with complicated channels and archipelagos frequented by small craft, require a method (the Comprehensive Code) giving more detailed identification of an aid. IALA Guideline R0106 - Retroreflecting Material on Aids to Navigation Marks within the IALA Maritime Buoyage System refers.

### AtoN in relation to autonomous vessels

Current applications, marks and signals as described in this document apply to all vessels, including Maritime Autonomous Surface Ships (MASS). MASS with varying degrees of automation, will utilize AtoN to a various extent, based on level of automation and type of technology applied to the actual vessel in accordance with the IMO levels of autonomy. It is the responsibility of the vessel’s command to ensure they can identify, interpret and assess navigation signals as designed in this reference document, so that levels of safety for life and marine environment are met.

# DEFINITIONS

The definitions of terms used in this IALA Guideline can be found in the International Dictionary of Marine Aids to Navigation (IALA Dictionary) at <http://www.iala-aism.org/wiki/dictionary> and were checked as correct at the time of going to print. Where conflict arises, the IALA Dictionary should be considered as the authoritative source of definitions used in IALA documents.

# ACRONYMS

AIS Automatic Identification System

ARM Aids to navigation Requirements and Management (IALA Committee)

AtoN Marine Aid(s) to Navigation

DGNSS Differential Global Navigation Satellite System

ECDIS Electronic Chart Display and Information System

ENC Electronic Nautical Chart

IALA International Association of Marine Aids to Navigation and Lighthouse Authorities

IHO International Hydrographic Organization

IMO International Maritime Organization

ISBN International Standard Book Number

MAtoN Mobile Aid(s) to Navigation

MBS Maritime Buoyage System

MMS Maritime Marking System

NE North East

NW North West

ODAS Ocean Data Acquisition Systems

Q Quick

SE South East

SIGNI SIGnalisation (des voies) de Navigation Interieure (European Code for Signs and Signals on Inland Waterways)

SN/Circ Safety of Navigation Circular (IMO)

SOLAS International Convention on Safety of Life at Sea

SW South West

VQ Very quick

|  |
| --- |
|  |

1. Regions A and B



Include MAtoN

1. Region A by day



Include MAtoN

1. Region B by day



Include MAtoN

1. Region A by night



Include MAtoN

1. Region B by night