IALA RECOMMENDATION (NORMATIVE)

R0110
RHYTHMIC CHARACTERS OF LIGHTS ON MARINE AIDS TO NAVIGATION

Edition 5.0

June 2021

urn:mrn:iala:pub:r0110:ed5.0

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International Association of Marine Aids to Navigation and Lighthouse Authorities
Association Internationale de Signalisation Maritime

DOCUMENT REVISION

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

Date	Details	Approval
October 2005	Edition 2.0 Tables amended to provide graphic representation and provide clearer representation of characteristics and keep in line with revised edition of IALA NAVGUIDE.	Council 37
April 2012	Edition 3.0 Table amended to include Emergency Wreck Marking Buoy due to Adoption of EWMB in the revised MBS.	Council 53
December 2016	Edition 4.0 Annex revision of text to remove guidance to the IALA Guideline on selection of rhythmic characters and synchronization of lights for AtoN and reformatting.	Council 63
June 2021	Edition 5.0 Front page, Table 2 and Table 3. Added flash character of Mobile AtoN and updated document numbering.	Council 73

THE COUNCIL

RECALLING the function of IALA with respect to Safety of Navigation, the efficiency of maritime transport and the protection of the environment,

RECALLING ALSO Article 8 of the IALA Constitution regarding the authority, duties and functions of the Council,

RECOGNIZING the need to provide guidance on the classes and limits within which the rhythmic characters of lights on Marine Aids to Navigation should be determined,

RECOGNIZING ALSO that such guidance should enable a common approach to be made world-wide, thus greatly assisting mariners, who, while passing through waters of different authorities, should not be confused by light characters that are difficult to read or understand, or that exist in too great a diversity,

CONSIDERING the proposals of the Engineering and Sustainability Committee,

ADOPTS the Recommendation on rhythmic characters of lights on Marine Aids to Navigation as described below,

INVITES Members and Marine Aids to Navigation Authorities worldwide to implement the rhythmic characters of lights on aids to navigation set out in the annex to this Recommendation,

RECOMMENDS National members and other appropriate Authorities providing Marine Aids to Navigation services comply with the following provisions in relation to the rhythmic characters presented by all-round lights, sector lights, leading lights and direction lights:

1 For new lights, determine their rhythmic characters by use of this Recommendation.

2 For existing lights, endeavour to make them conform to the annex to this Recommendation as soon as practicable.

3 Comply with this Recommendation, in order to harmonize the determination of the rhythmic characters of lights on Marine Aids to Navigation on a worldwide basis. References to the IALA Maritime Buoyage System are included where appropriate.

4 Refer to IALA Guideline *G1116 Selection of Rhythmic Characters and Synchronisation of Lights for Aids to Navigation*.

5 All characters used should be in conformity with the general recommendations of this document. (Note 3)

6 The *International Dictionary of Marine Aids to Navigation*, Chapter 2, Visual Aids, should be consulted for definitions of the types and characteristics of lights on aids to navigation.

7 The lights of the special marks should not show any of the rhythmic characters that have been assigned to the marks showing white lights. (Note 4)

8 The white lights of the cardinal marks be given a characteristic identity by the use of flashes at the rates for very quick lights or quick lights as the whole or a part of each of the rhythmic characters assigned to them. (Note 5)

9 A light must, on a given bearing, maintain a consistent character.

10 The periods of the characters of rhythmic lights should be selected in accordance with location-specific navigational requirements. The period should not exceed the values in Table 1.

11 Rhythmic characters of lights should be classified in accordance with Table 2.

12 Rhythmic characters of the lights in the IALA Maritime Buoyage System should be set up in accordance with Table 3.

REQUESTS the Engineering and Sustainability Committee or such other committee as the Council may direct to keep the Recommendation under review and to propose amendments as necessary.

ANNEX A RHYTHMIC CHARACTERS OF LIGHTS ON MARINE AIDS TO NAVIGATION

Table 1 Maximum periods

Class	Maximum period
Isophase light	12 s
Single-occulting light Single-flashing light Group very quick light	15 s
Group-occulting light of two eclipses Long-flashing light Group-flashing light of two flashes Group quick light	20 s
Group-occulting light of three or more eclipses Group-flashing light of three or more flashes Composite group-flashing light Morse Code light	30 s

Notes:

1 A rhythmic light is described as a light showing intermittently with a regular periodicity. The rhythmic character of such a light is the sequence of different appearances presented by the light during a period.

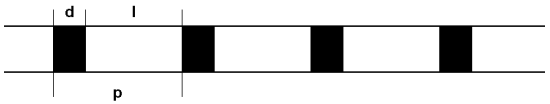
2 In Table 2 each class or sub-class of light character is described in general terms by a statement in the third column, which is headed “General description”. These statements have been adopted by the International Hydrographic Organization and national hydrographic organizations for use in their publications, and they are written so as to include, in one class or another, the light characters that exist on Marine Aids to Navigation. Therefore, the classes that are recommended by IALA are not fully described in the third column of the table and further necessary details for the design of recommended light characters are given in the fourth column, which is headed “IALA Specification”. It is essential that the third and fourth columns are read together and the rhythmic characters of lights conform with the requirements of the “IALA Specification” if they are to conform with these recommendations.

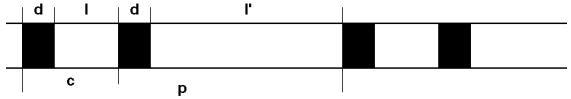
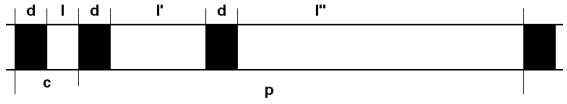
3 This Recommendation classifies the rhythmic characters of the lights for the marks in the IALA Maritime Buoyage System with some remarks and further recommendations.

4 Lights of different colours are used to assist identification of the marks in the IALA Maritime Buoyage System. Red and green lights for the lateral marks, white lights for the cardinal, isolated-danger and safe-water marks, yellow lights for the special marks and blue/yellow lights for wreck marking buoys.

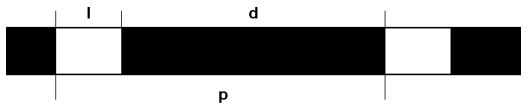
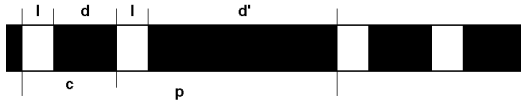
5 Identification of any one of the four cardinal marks does not require knowledge of which of the two rates is being shown unless two similar marks are in the same area and even then, the periods of the rhythmic characters will be different.

Table 2 Rhythmic character of lights

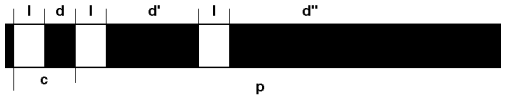
	Class	Abbreviation	General description	IALA Specification	Particular use in the IALA Maritime Buoyage System
1	FIXED LIGHT	F	A light showing continuously and steadily.	A single fixed light should be used with care because it may not be recognized as an aid to navigation light.	A single fixed light shall not be used.
2	OCCULTING LIGHT		A light in which the total duration of light in a period is longer than the total duration of darkness and the intervals of darkness (eclipses) are usually of equal duration.	A light in which the total duration of light in a period *is clearly* longer than the total duration of darkness and all the eclipses are of equal duration.	
2.1	Single-occulting light	Oc	An occulting light in which an eclipse is regularly repeated	The duration of an appearance of light should not be less than three times the duration of an eclipse. The period should not be less than 2 s	A single-occulting *White* light indicates a safe-water mark.
				 l ≥ 3 d p ≥ 2 s Example: d = 1 s; l = 3 s; p = 4 s	

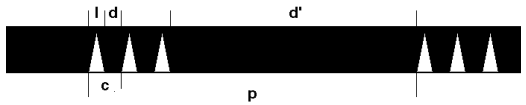
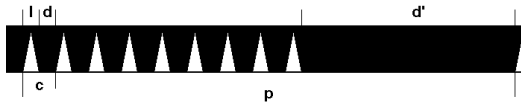
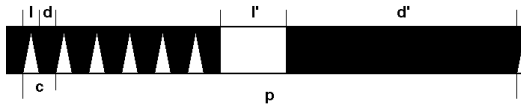
	Class	Abbreviation	General description	IALA Specification	Particular use in the IALA Maritime Buoyage System
2.2	Group-occulting light	Oc(#) e.g. Oc(2)	An occulting light in which a group of eclipses, specified in number, is regularly repeated.	The appearances of light between the eclipses in a group are of equal duration, and this duration is clearly shorter than the duration of the appearance of light between successive groups. The number of eclipses in a group should not be greater than four in general, and should be five only as an exception. The duration of an appearance of light within a group should not be less than the duration of an eclipse. The duration of an appearance of light between groups should not be less than three times the duration of an appearance of light within a group. In a group of two eclipses, the duration of an eclipse together with the duration of the appearance of light within a, group should not be less than 1 s. In a group of three or more eclipses, the duration of an eclipse together with the duration of an appearance of light within the group should not be less than 2 s.	A group-occulting *Yellow* light indicates a special mark.
				Oc(2)  $l \geq d$ $l' \geq 3\,l$ $c \geq 1$ s Example: d = 1 s; l = 2 s; c = 3 s; l’ = 6 s; p = 10 s	
2.3	Composite group-occulting light	Oc(#+#) e.g. Oc(2 + 1)	A light similar to a group-occulting light except that successive groups in a period have different numbers of eclipses.	This class of light character is not recommended because it is difficult to recognize.	
				Oc(2+1)  $l \geq d$ $l' \geq 3\,l$ $l'' \geq l'$ $c \geq 1$ s Example: d = 1 s; l = 1 s; c = 2 s; l’ = 3 s; l’’ = 9 s; p = 16 s	

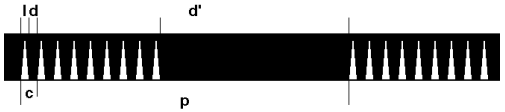
	Class	Abbreviation	General description	IALA Specification	Particular use in the IALA Maritime Buoyage System
3	ISOPHASE LIGHT	Iso	A light in which all the durations of light and darkness are clearly equal.	The period should never be less than 2 s, but preferably it should not be less than 4 s in order to reduce the risk of confusion with occulting or flashing lights of similar periods.  l = d p ≥ 2 s Example: l = d = 2 s; p = 4 s	An isophase *White* light indicates a safe-water mark.
4	FLASHING LIGHT		A light in which the total duration of light in a period is shorter than the total duration of darkness and the appearances of light (flashes) are usually of equal duration.	A light in which the total duration of light in a period is *clearly* shorter than the total duration of darkness and all the flashes are of equal duration.	
4.1	Single flashing light	Fl	A flashing light in which a flash is regularly repeated (at a rate of less than 50 flashes per minute).	The duration of the interval of darkness (eclipse) between two successive flashes should not be less than three times the duration of a flash. The period should not be less than 2 s (or not less than 2.5 s in those countries where a quick rate of 50 flashes per minute is used).  d ≥ 3 l p ≥ 2 s Example: l = 1 s; d = 3 s; p = 4 s	A single-flashing *Yellow* light indicates a special mark.

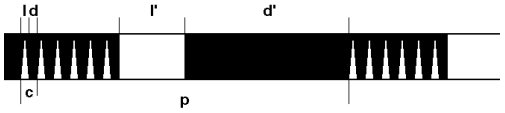
	Class	Abbreviation	General description	IALA Specification	Particular use in the IALA Maritime Buoyage System
4.2	Long flashing light	LFl	A single-flashing light in which an appearance of light of not less than 2 s duration (long flash) [1] is regularly repeated.	 l ≥ 2 s d ≥ 3 l Example: l = 2 s; d = 8 s; p = 10 s	A long-flashing *White* light with a period of 10 s indicates a safe-water mark.
4.3	Group flashing light	Fl(#) e.g. Fl(2)	A flashing light in which a group of flashes, specified in number, is regularly repeated.	The eclipses between the flashes in a group are of equal duration, and this duration is clearly shorter than the duration of the eclipse between successive groups. The number of flashes in a group should not be greater than five in general, and should be six only as an exception. The duration of an eclipse within a group should not be less than the duration of a flash. The duration of an eclipse between groups should not be less than three times the duration of an eclipse within a group. In a group of two flashes, the duration of a flash together with the duration of the eclipse within the group should not be less than 1 s. In a group of three or more flashes, the duration of a flash together with the duration of an eclipse within a group should not be less than 2 s (or not less than 2.5 s in those countries where a quick rate of 50 flashes per minute is used). Fl(2)  d ≥ l d' ≥ 3 d c ≥ 1 s Example: l = 1 s; d = 2 s; c = 3 s; d' = 6 s; p = 10 s	A group-flashing *White* light with a group of two flashes, in a period of 5 s or 10 s, indicates an isolated-danger mark. A group-flashing *Yellow* light with a group of four, five or (exceptionally) six flashes indicates a special mark
4.4		Fl(# + #)	A light similar to a group-flashing light	Light characters should be restricted to (2 + 1) flashes in general, and should be (3 + 1) flashes only as an exception.	A composite group-flashing *Red* or

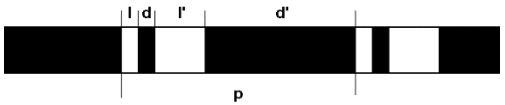
1 The term "long flash", which is used in the descriptions of the long-flashing light and of the light characters reserved for south cardinal marks, means an appearance of light of not less than 2 seconds duration. The term "short flash" is not commonly used and does not appear in the Classification. If an Authority requires discrimination between two flashing lights that only differ in having flashes of different durations, then the longer flash should be described as "long flash" and be of not less than 2 seconds duration, and the shorter flash may be described as "short flash" and should be of not more rhythmic character of such a light is than one third of the duration of the longer flash.

	Class	Abbreviation	General description	IALA Specification	Particular use in the IALA Maritime Buoyage System
	Composite group-flashing light	e.g. Fl(2 + 1)	except that successive groups in a period have different numbers of flashes.	Fl(2+1)  d ≥ l d' ≥ 3 d d'' ≥ d' c ≥ 1 s Example: l = 1 s; d = 1 s; c = 2 s; d' = 3 s; d'' = 9 s; p = 16 s	*Green* light with a group of (2 + 1) flashes indicates a modified lateral (preferred-channel) mark. A composite group-flashing *Yellow* light indicates a special mark.
5	QUICK LIGHT		A light in which flashes are repeated at a rate of not less than 50 flashes per minute but less than 80 flashes per minute.	A light in which identical flashes are repeated at the rate of 60 flashes per minute.	
5.1	Continuous quick light	Q	A quick light in which a flash is regularly repeated.	 d ≥ l l s ≤ p ≤ 1.2 s Example: l = d = 0.5 s; p = 1 s	A continuous quick *White* light indicates a north cardinal mark.

	Class	Abbreviation	General description	IALA Specification	Particular use in the IALA Maritime Buoyage System
5.2	Group quick light	Q(#) e.g. Q(3) e.g. Q(9) e.g. Q(6) + LFl	A quick light in which a specified group of flashes is regularly repeated.	The number of flashes in a group should be three or nine. An exceptional light character is reserved for use in the IALA Maritime Buoyage System to indicate a south cardinal mark. Q(3)  d ≥ l d'>d 1 s ≤ c ≤ 1.2 s Example: l = d = 0.5 s; c = 1 s ; d' = 7.5 s; p = 10 s Q(9)  d ≥ l d'>d 1 s ≤ c ≤ 1.2 s Example: l = d = 0.5 s; c = 1 s; d' = 6.5 s; p = 15 s Q(6) +LFl  l' ≥ 2 s d ≥ l d' ≥ 3 l' 1 s ≤ c ≤ 1.2 s Example: l = d = 0.5 s; c = 1 s; l' = 2 s; d' = 7 s; p = 15 s	A group quick *White* light with a group of three flashes, in a period of 10 s, indicates an east cardinal mark. A group quick *White* light with a group of nine flashes, in a period of 15 s, indicates a west cardinal mark. A group quick *White* light with a group of six flashes followed by a long flash of not less than 2 s duration, in a period of 15 s, indicates a south cardinal mark.

	Class	Abbreviation	General description	IALA Specification	Particular use in the IALA Maritime Buoyage System
6	VERY QUICK LIGHT		A light in which flashes are repeated at a rate of not less than 80 flashes per minute but less than 160 flashes per minute.	A light in which identical flashes are repeated at the rate of 120 flashes per minute.	
6.1	Continuous very quick light	VQ	A very quick light in which a flash is regularly repeated.	 d ≥ l 0.5 s ≤ p ≤ 1.6 s Example: l = d = 0.25 s; p = 0.5 s	A continuous very quick *White* light indicates a north cardinal mark.
6.2	Group very quick light	VQ(#) e.g. VQ(3) e.g. VQ(9) e.g. VQ(6)+LFl	A very quick light in which a specified group of flashes is regularly repeated.	The number of flashes in a group should be three or nine. An exceptional light character is reserved for use in the IALA Maritime Buoyage System to indicate a south cardinal mark. VQ(3)  d ≥ l d' ≥ 1.5 s 0.5 s ≤ c ≤ 0.6 s Example: l = d = 0.25 s; c = 0.5 s; d’ = 3.75 s; p = 5 s VQ(9)  d ≥ l d' ≥ 1.5 s 0.5 s ≤ c ≤ 0.6 s Example: l = d = 0.25 s; c = 0.5 s; d’ = 5.75 s; p = 10 s	A group very quick *White* light with a group of three flashes, in a period of 5 s, indicates an east cardinal mark. A group very quick *White* light with a group of nine flashes, in a period of 10 s, indicates a west cardinal mark.

	Class	Abbreviation	General description	IALA Specification	Particular use in the IALA Maritime Buoyage System
				VQ(6) +LFl  l' ≥ 2 s d ≥ l d' ≥ 1.5 l' 0.5 s ≤ c ≤ 0.6 s Example: l = d = 0.25 s; c = 0.5 s; l' = 2 s; d' = 5 s; p = 10 s	A group very quick *White* light with a group of six flashes followed by a long flash of not less than 2 s duration, in a period of 10 s, indicates a south cardinal mark.
7	ULTRA QUICK LIGHT		A light in which flashes are repeated at a rate of not less than 160 flashes per minute and not more than 300 flashes per minute.	A light in which identical flashes are repeated at the rate of 240 flashes per minute.	
7.1	Continuous ultra quick light	UQ	An ultra quick light in which a flash is regularly repeated.		

	Class	Abbreviation	General description	IALA Specification	Particular use in the IALA Maritime Buoyage System
8	MORSE CODE LIGHT	Mo(#) e.g. Mo(A)	A light in which appearances of light of two clearly different durations are grouped to represent a character or characters in the Morse Code.	Light characters should be restricted to a single letter in the Morse Code in general, and should be two letters only as an exception. The duration of a "dot" should be about 0.5 s, and the duration of a "dash" should not be less than three times the duration of a "dot". Mo(A)  l = 0.5 s l' ≥ 3 l d ≥ l Example: l = 0.5 s; d = 0.5 s; l' = 1.5 s; d' = 4.5 s; p = 7 s	A Morse Code White light with the single character "A" indicates a safe-water mark. A Morse Code Yellow light, but not with either of the single characters "A" or "U"*, indicates a special mark.
9	FIXED AND FLASHING LIGHT	F+ relevant character abbreviation, e.g. FFl, FIso	A light in which a low intensity fixed light phase is combined with a flashing phase of higher luminous intensity compliant with preceding classes of rhythmic characters in this table.	Implementation of an FFl rhythmic character is shown below. Other combinations may be implemented as necessary.  l ≤ 1 s d ≥ 3 l Example: l = 1 s; d = 3 s; p = 4 s	

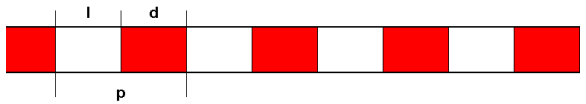
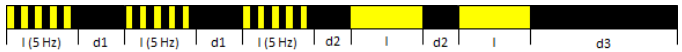
	Class	Abbreviation	General description	IALA Specification	Particular use in the IALA Maritime Buoyage System
10	ALTERNATING LIGHT	Al## e.g. AlWR	A light showing different colours alternately.	This class of light character should be used with care, and efforts should be made to ensure that the different colours appear equally visible to an observer. AlWR  l ≅ d Example: l = d = 2 s; p = 4 s	
11	OCCULTING ALTERNATING LIGHT	OcAl	A light showing different colours alternately and a light in which the total duration of light in an period is longer than the total duration of darkness and the intervals of darkness (eclipses) are of equal duration.	OcAlBY This class of light is particular to the use of Emergency Wreck Marking, and efforts should be made to ensure that the different colours appear equally visible to an observer.  l = 1s d = 0.5s p = 3s	An Occulting-Alternating Blue and Yellow light indicates an Emergency Wreck Marking Buoy mark.
12	FLICKERING LIGHT	Flkr	A character containing flashes with a perceivable flicker. The flickering flash must have a frequency of 5 Hz and a duty cycle of 50 %.	Flkr(3)+Fl(2)Y This class of light is particular to the use of Mobile AtoN, and is a distinctive character incorporating flicker and non-flicker flashes. The first three flashes comprises of a flicker flash with a flicker frequency of 5 Hz. This is followed by two non-flicker flashes.  l = 1 s d1 = 0.7 s d2 = 0.5 s d3 = 3 s p = 10.4 s	This character is used solely for the Mobile AtoN application. The light colour is always yellow.

Table 3 Rhythmic characters of the lights in the IALA Maritime Buoyage System

Mark	Rhythmic character of the light	Remarks and further recommendations
LATERAL	All recommended classes of rhythmic character[2], but a composite group flashing light with a group of (2+1) flashes is solely assigned to modified lateral marks that indicate preferred channels.	Only the colours Red and Green are used.
Modified lateral (preferred channel)	Composite group flashing light with a group of (2+1) flashes, in a period of not more than 16 s.	
CARDINAL		Only the colour White is used.
North cardinal	(a) Continuous very quick light. (b) Continuous quick light.	
East cardinal	(a) Group very quick light with a group of three flashes, in a period of 5 s. (b) Group quick light with a group of three flashes, in a period of 10 s.	
South cardinal	(a) Group very quick light with a group of six flashes followed by a long flash of not less than 2 s duration, in a period of 10 s. (b) Group quick light with a group of six flashes followed by a long flash of not less than 2 s duration, in a period of 15 s.	The duration of the eclipse immediately preceding a long flash should be equal to the duration of the eclipses between the flashes at the very quick rate. The duration of a long flash should not be greater than the duration of the eclipse immediately following the long flash. The duration of the eclipse immediately preceding a long flash should be equal to the duration of the eclipses between the flashes at the quick rate. The duration of a long flash should not be greater than the duration of the eclipse immediately following the long flash.

2 A single fixed light shall not be used on a mark within the scope of the IALA Maritime Buoyage System because it may not be recognized as an aid to navigation light.

Mark	Rhythmic character of the light	Remarks and further recommendations
West cardinal	(a) Group very quick light with a group of nine flashes, in a period of 10 s. (b) Group quick light with a group of nine flashes, in a period of 15 s.	
ISOLATED DANGER	(a) Group-flashing light with a group of two flashes, in a period of 5 s. (b) Group-flashing light with a group of two flashes, in a period of 10 s.	Only the colour White is used. The duration of a flash together with the duration of the eclipse within the group should be not less than 1 s and not more than 1.5 s. The duration of a flash together with the duration of the eclipse within the group should be not less than 2 s and not more than 3 s.
SAFE-WATER	(a) Long-flashing light with a period of 10 s. (b) Isophase light. (c) Single-occulting light. (d) Morse Code light with the single character "A".	Only the colour White is used.
SPECIAL	(a) Group-occulting light. (b) Single-flashing light, but not a long-flashing light with a period of 10 s. (c) Group-flashing light with a group of four, five or (exceptionally) six flashes. (d) Composite group-flashing light. (e) Morse Code light, but not with either of the single characters "A" or “U”[3].	Only the colour Yellow is used. A group-flashing light with a group of five flashes at a rate of 30 flashes per minute, in a period of 20 s, is assigned to Ocean Data Acquisition Systems (ODAS) buoys.
EMERGENCY WRECK MARKING BUOY	Occulting Alternating light with a period of 3s	Only the colours Blue and Yellow are used
MOBILE ATON	Three flicker flashes followed by two non-flicker flashes with a period of 10.4 s.	Only the colour Yellow is used.

3 A Morse Code white light with the single character "U" is assigned to offshore structures.