

**Economic and Social Council**Distr.: General
1 December 2017

Original: English

Economic Commission for Europe**Inland Transport Committee****Working Party on Inland Water Transport****Working Party on the Standardization of Technical
and Safety Requirements in Inland Navigation****Fifty-second session**

Geneva, 14-16 February 2018

Item 6 (b) of the provisional agenda

**Standardization of technical and safety requirements in inland
navigation: Signs and Signals on Inland Waterways (SIGNI)****(Resolution No. 22, revision 2)****Proposal for updating provisions for rhythmic lights in
SIGNI on the basis of IALA Recommendation No. E-110
“Rhythmic characters of lights on aids to navigation”****Note by the secretariat****I. Mandate**

1. This document is submitted in line with cluster 5: Inland Waterway Transport, paragraph 5.1 of the programme of work 2018–2019 (ECE/TRANS/SC.3/2017/24) to be adopted by the Inland Transport Committee at its eightieth session (20-23 February 2018).
2. At its sixty-first session, the Working Party on Inland Water Transport (SC.3) began considering the third revision of the Signs and Signals for Inland Waterways (SIGNI) (Resolution No. 22, revision 2) as set out in ECE/TRANS/SC.3/2017/11/Rev.1 with a view of its adoption in 2018 (ECE/TRANS/SC.3/205, paras. 46-47).
3. As part of this work, the Working Party on the Standardization of Technical and Safety Requirements in Inland Navigation (SC.3/WP.3) may wish to update provisions for rhythmic lights that are contained in SIGNI on the basis of Edition 4.0 of Recommendation E-110 “Rhythmic Characters of Lights on Aids to Navigation” of the International

Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) adopted on 16 December 2016.¹

II. Definition

4. SC.3/WP.3 may wish to bring the proposed definition of a rhythmic light (ECE/TRANS/SC.3/2017/11/Rev.1, para. 1.2.1) in line with IALA Recommendation E-110 (Note 1) on the basis of the definitions used in the Hydrographic Dictionary of the International Hydrographic Organization, Special Publication No. 32, the fifth edition,² and the International Dictionary of Marine Aids to Navigation of IALA, Chapter 2:³

Rhythmic light is a signal light that shows 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.

III. Maximum periods of rhythmic lights

5. SC.3/WP.3 may wish to determine values of maximum periods of rhythmic characters of lights from the table “Maximum periods” of IALA Recommendation E-110 as given in Table 1 below.

Table 1
Maximum periods of rhythmic characters of lights

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

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

¹ www.iala-aism.org/product/rhythmic-characters-of-lights-on-aids-to-navigation-e-110/.

² www.iho.int/iho_pubs/standard/S-32/S-32-eng.pdf.


³ www.iala-aism.org/wiki/dictionary/.

IV. Rhythmic character of lights



6. In paragraphs 3.2.3, 3.3.2, 4.2.1 and 5.1.2 of ECE/TRANS/SC.3/2017/11/Rev.1, SC.3/WP.3 may wish to replace “scintillating light” by “quick light” and “quick scintillating light” by “very quick light”.



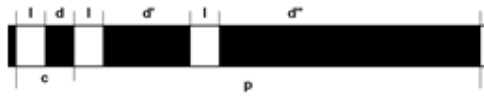
7. SC.3/WP.3 may wish to update the table “Rhythmic lights” from Annex 1 to Resolution No. 22, revision 2, on the basis of Table 2 “Rhythmic character of lights” of IALA Recommendation E-110, which will be included in the third revision of SIGNI as Appendix 4. The updated table is below.



Table 2
Rhythmic lights

Class	Abbreviation	General description	Specification	Particular use
1	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.	
1.1	Single-occulting light	An occulting light in which an eclipse is regularly repeated.	<p>The duration of an appearance of light should not be less than three times the duration of an eclipse. The duration of an eclipse should preferably be between 0.5 s and 1 s. The period should not be less than 2 s.</p>  <p style="text-align: right;"> $1 \geq 3 d$ $0.5 \text{ s} \leq d \leq 1 \text{ s}$ $p \geq 2 \text{ s}$ </p> <p>Example: $l = 3 \text{ s}$; $d = 1 \text{ s}$; $p = 4 \text{ s}$</p>	<p>A single-occulting white light indicates:</p> <ul style="list-style-type: none"> - a safe-water mark. <p>A single-occulting yellow light indicates:</p> <ul style="list-style-type: none"> - a cross-over mark.
1.2	Group-occulting light	An occulting light in which a group of eclipses, specified in number, is regularly repeated.	<p>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 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. The duration of an appearance of light within a group should not be less than the duration of an eclipse. The duration of an eclipse should preferably be between 0.5 s and 1 s. In a group of two eclipses, the duration of an eclipse together with the duration of an appearance of light within the 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. The number of eclipses in a group should not be greater than four in general, and should be five only as an exception.</p>	<p>A group-occulting yellow light may indicate:</p> <ul style="list-style-type: none"> - a special mark; - a cross-over mark.

Class	Abbreviation	General description	Specification	Particular use
			<p>Oc(2)</p> <p>$l' \geq 3 l$ $l \geq 3 d$ $0.5 s \leq d \leq 1 s$ $c \geq 1 s$</p> <p>Example: $l' = 6 s$; $l = 2 s$; $d = 1 s$; $c = 3 s$; $p = 10 s$</p>	
1.3	Composite group-occluding light	Oc(#+#) e.g. Oc(2+1)	<p>A light similar to a group-occluding light except that successive groups in a period have different numbers of eclipses.</p> <p>This class of light character is not recommended because it is difficult to recognize.</p> <p>Oc(2+1)</p> <p>$l'' \geq l'$ $l' \geq 3 l$ $l \geq d$ $c \geq 1 s$</p> <p>Example: $l'' = 9 s$; $l' = 3 s$; $l = 1 s$; $d = 1 s$; $c = 2 s$; $p = 16 s$</p>	
2	ISOPHASE LIGHT	ISO	<p>A light in which all the durations of light and darkness are clearly equal.</p> <p>The period should not be less than 4 s 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.</p> <p>Example: $l = d = 2 s$; $p = 4 s$</p>	<p>An isophase white light may indicate:</p> <ul style="list-style-type: none"> - a safe-water mark; - a bifurcation mark; - a mark outside the fairway indicating obstacles and danger points, if they can be passed on either side; - an advance signal.
3	FLASHING LIGHT		<p>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.</p> <p>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.</p>	<p>A single-occluding white light indicates a safe-water mark.</p>




Class	Abbreviation	General description	Specification	Particular use
3.1 Single-flashing light	FI	A flashing light in which a flash is regularly repeated (at a rate of 30 or less than 50 flashes per minute).	<p>The duration of the interval of darkness (eclipse) between two successive flashes should not be less than three times the duration of a flash.</p> <p>The duration of a flash should not be longer than 1 s. 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).</p>  <p>$d \geq 3 l$ $l \leq 1 \text{ s}$ $p \geq 2 \text{ s}$</p> <p>Example: $d = 3 \text{ s}$; $l = 1 \text{ s}$; $p = 4 \text{ s}$</p>	<p>A single-flashing yellow light may indicate:</p> <ul style="list-style-type: none"> - a special mark; - a cross-over mark.
3.2 Long-flashing light	LFI	A single-flashing light in which an appearance of light of not less than 2 s duration (long flash) is regularly repeated.	 <p>$d \geq 3 l$ $l \geq 2 \text{ s}$ $p = 10 \text{ s}$</p> <p>Example: $d = 8 \text{ s}$; $l = 2 \text{ s}$; $p = 10 \text{ s}$</p>	<p>A long-flashing white light with a period of 10 s indicates:</p> <ul style="list-style-type: none"> - a safe-water mark.
3.3 Group-flashing light	FI(#) e.g. FI(2)	A flashing light in which a group of flashes, specified in number, is regularly repeated.	<p>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.</p> <p>The duration of an eclipse between groups should not be less than three times the duration of an eclipse within a group.</p> <p>The duration of an eclipse within a group should not be less than the duration of a flash.</p> <p>The duration of a flash should not be longer than 1 s.</p> <p>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.</p> <p>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).</p> <p>The number of flashes in a group should not be greater than five in general, and should be six only as an exception.</p>	<p>A group-flashing white light with a group of two flashes, in a period of 5 s or 10 s, indicates:</p> <ul style="list-style-type: none"> - an isolated-danger mark. <p>A group-flashing white light with a group of three flashes indicates:</p> <ul style="list-style-type: none"> - a bifurcation mark. <p>A group-flashing yellow light with a group of four, five or (exceptionally) six flashes may indicate :</p>

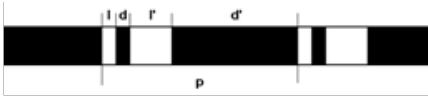


Class	Abbreviation	General description	Specification	Particular use
			 <p>FI(2)</p> <p>Example: $d' = 6$ s; $d = 2$ s; $l = 1$ s; $c = 3$ s; $p = 10$ s</p>	$d' \geq 3d$ - a special mark; $d \geq l$ - a cross-over mark. $l \leq 1$ s $c \geq 1$ s
			 <p>FI(2)</p> <p>Example: $d' = 6$ s; $d = 2$ s; $l = 1$ s; $c = 3$ s; $p = 10$ s</p>	$d' \geq 3d$ $d \geq l$ $l \leq 1$ s $c \geq 1$ s
3.4	Composite group-flashing light	FI(+,+) FI(# + #) e.g. FI(2 + 1)	A flashing light in which a group of flashes, specified in number, is regularly repeated. The duration of the eclipse after the single flash should not be less than three times the duration of the eclipse after the group of flashes. 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 yellow light indicates: - a special mark. A composite group-flashing red or green light with a group of (2 + 1) flashes indicates: - a modified lateral (preferred-channel) mark.
			 <p>FI(2+1)</p> <p>Example: $d'' = 9$ s; $d' = 3$ s; $d = 1$ s; $l = 1$ s; $c = 2$ s; $p = 16$ s</p>	$d'' \geq 3 d'$ $d' \geq 3 d$ $d \geq l$ $l \leq 1$ s $c \geq 1$ s

Class	Abbreviation	General description	Specification	Particular use
4	SCINTILLATING QUICK LIGHT	A light in which identical flashes are repeated at a rate between 40 and 60 of not less than 50 flashes per minute but less than 80 flashes* per minute.	The duration of an eclipse should not be less than the duration of a flash. A light in which identical flashes are repeated at the rate of 60 flashes per minute.	
4.1	Continuous scintillating quick light	Q	A scintillating-quick light in which a flash is regularly repeated.	 <p>$d \geq 1$</p> <p>$1 \text{ s} \leq p \leq 1.5$ 1.2 s</p> <p>Example: $l = d = 0.5 \text{ s}$; $p = 1 \text{ s}$</p> <p>A continuous scintillating quick white light may indicate:</p> <ul style="list-style-type: none"> - a north cardinal mark; - a bifurcation mark; - a mark outside the channel indicating obstacles and danger points, if they can be passed on either side.
4.2	Group scintillating quick light	Q(#) e.g. Q(3) e.g. Q(9) e.g. Q(6) + LFI	A scintillating-quick light in which a specified group of flashes is regularly repeated.	<p>The number of flashes in a group should be three or nine. An exceptional light character is reserved to indicate a south cardinal mark. The duration of the long eclipse should not be less than 3 s.</p> <p>Q(3)</p>  <p>$d' \geq 3 \text{ s}$</p> <p>$d \geq 1$</p> <p>$d' \geq d$</p> <p>$1 \text{ s} \leq c \leq 1.5$ 1.2 s</p> <p>$p = 10 \text{ s}$</p> <p>A group scintillating quick white light with a group of three flashes, in a period of 10 s, indicates:</p> <ul style="list-style-type: none"> - an east cardinal mark.

* The competent authorities should choose the rates for all their quick-scintillating lights and all their very quick scintillating lights: either 60 and 120 flashes per minute or 50 and 100 flashes per minute.

Class	Abbreviation	General description	Specification	Particular use	
			Example: $d' = 7.5 \text{ s}$; $l = d = 0.5 \text{ s}$; $c = 1 \text{ s}$; $p = 10 \text{ s}$		
			Q(9)	$d' \geq 3 \text{ s}$ $d \geq 1$ $d' \geq d$ $1 \text{ s} \leq c \leq 1.5 \text{ s}$ $p = 15 \text{ s}$	A group scintillating quick white light with a group of nine flashes, in a period of 15 s, indicates: - a west cardinal mark.
			Example: $d' = 6.5 \text{ s}$; $l = d = 0.5 \text{ s}$; $c = 1 \text{ s}$; $p = 15 \text{ s}$		
			Q(6)+LF1	$d' \geq 3 \text{ s}$ $d \geq 1$ $l' \geq 2 \text{ s}$ $1 \text{ s} \leq c \leq 1.5 \text{ s}$ $p = 15 \text{ s}$	A group scintillating 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.
			Example: $d' = 7 \text{ s}$; $l' = 2 \text{ s}$; $l = d = 0.5 \text{ s}$; $c = 1 \text{ s}$; $p = 15 \text{ s}$		
5.	VERY QUICK SCINTILLATING LIGHT	A light in which identical flashes are repeated at a rate between 100 and 120 of not less than 80 flashes per minute but less than 160 flashes* per minute.	The duration of an eclipse should not be less than the duration of a flash. A light in which identical flashes are repeated at the rate of 120 flashes per minute.		
5.1	Continuous very quick scintillating very quick scintillating light	A very quick scintillating light in which a flash is regularly repeated.		$d \geq 1$ $0.5 \text{ s} \leq p \leq 1.6 \text{ s}$	A continuous quick scintillating white light indicates: - a north cardinal mark.
			Example: $l = d = 0.25 \text{ s}$; $p = 0.5 \text{ s}$		

Class	Abbreviation	General description	Specification	Particular use
5.2 Group very quick scintillating light	VQ(#) e.g. VQ(3) e.g. VQ(9) e.g. VQ(6)+LFI	A very quick scintillating light in which a specified group of flashes is regularly repeated.	Identical with group scintillating light except for the frequency of the flashes $0.5 < c < 0.6s^*$ and the period. The number of flashes in a group should be three or nine. An exceptional light character is reserved for use to indicate a south cardinal mark.	
			<p>VQ(3)</p>  <p>$d' > 1.5 s$ $d \geq 1$ $0.5 s \leq c \leq 0.6 s$</p> <p>Example: $d' = 3.75 s$; $l = d = 0.25 s$; $c = 0.5 s$; $p = 5 s$</p>	<p>A group very quick scintillating white light with a group of six flashes, in a period of 5 s, indicates:</p> <ul style="list-style-type: none"> - an east cardinal mark.
			<p>VQ(9)</p>  <p>$d' > 1.5 s$ $d \geq 1$ $0.5 s \leq c \leq 0.6 s$</p> <p>Example: $d' = 5.75 s$; $l = d = 0.25 s$; $c = 0.5 s$; $p = 10 s$</p>	<p>A group very quick scintillating white light with a group of nine flashes, in a period of 10 s, indicates:</p> <ul style="list-style-type: none"> - a west cardinal mark.
			<p>VQ(6)+LFI</p>  <p>$d' \geq 1.5 l'$ $l' \geq 2 s$ $d \geq 1$ $0.5 s \leq c \leq 0.6 s$</p> <p>Example: $d' = 5 s$; $l' = 2 s$; $l = d = 0.25 s$; $c = 0.5 s$; $p = 10 s$</p>	<p>A group very quick scintillating 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:</p> <ul style="list-style-type: none"> - a south cardinal mark.

Class	Abbreviation	General description	Specification	Particular use
6	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.	
6.1	Continuous ultra quick light	UQ	An ultra quick light in which a flash is regularly repeated.	
7	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".
			 <p>Mo(A)</p> <p>Example: $l' = 1.5$ s; $l = 0.5$ s; $d = 0.5$ s; $d' = 4.5$ s; $p = 7$ s</p>	<p>A Morse Code white light with the single character "A" indicates:</p> <ul style="list-style-type: none"> - a safe-water mark. <p>A Morse Code yellow light, but not with either of the single characters "A" or "U", indicates:</p> <ul style="list-style-type: none"> - a special mark.
8	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.
			 <p>Example: $d = 3$ s; $l = 1$ s; $p = 4$ s</p>	<p>$d \geq 3 l$</p> <p>$l \leq 1$ s</p>
9	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.
			 <p>Example: $l = d = 2$ s; $p = 4$ s</p>	<p>$l \cong d$</p> <p>$l \leq 1$ s</p>

<i>Class</i>	<i>Abbreviation</i>	<i>General description</i>	<i>Specification</i>	<i>Particular use</i>
10 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.	<p>This class of light is particular to the use of New Danger Marking, and efforts should be made to ensure that the different colours appear equally visible to an observer.</p> <p>OcAlBY</p> <p>l = 1 s; d = 0.5 s; p = 3 s</p>	<p>An occulting- alternating blue and yellow light indicates:</p> <ul style="list-style-type: none"> - a New Danger mark.

V. Subsequent amendments to the description of the character of rhythmic lights in CEVNI

8. SC.3/WP.3 may also wish to update accordingly provisions for rhythmic lights in the European Code for Inland Waterways (CEVNI) contained in:

- Chapter 1, part III, para. 3;
 - Articles 3.08, 3.27, 3.28, 6.04 and 9.04; and
 - Annexes 3 and 8.
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