INTERNATIONAL HYDROGRAPHIC ORGANIZATION

ORGANISATION HYDROGRAPHIQUE INTERNATIONALE

# CHART STANDARDIZATION & PAPER CHART WORKING GROUP (CSPCWG)

[A Working Group of the Committee on Hydrographic Requirements for Information Systems – CHRIS]

Chairman: Peter JONES
Secretary: Andrew HEATH-COLEMAN

UK Hydrographic Office
Admiralty Way, Taunton, Somerset
TA1 2DN, United Kingdom

Telephone:
(Chairman) +44 (0) 1823 337900 ext 3020
(Secretary) +44 (0) 1823 337900 ext 3656
Facsimile: +44 (0) 1823 325823
E-mail: peter.jones@ukho.gov.uk
andrew.coleman@ukho.gov.uk

**CSPCWG Letter: 08/2008**

UKHO ref: HA317/010/031-05 & HA317/004/058-06

**To CSPCWG Members** Date 02 June 2008

Dear Colleagues,

**Subject: Draft revision M-4 Section B-450 to B-479 – Round 4**

We received a really encouraging response to CSPCWG Letter 06/2008; 20 WG members commented on the third draft revision of M-4 sections B-450 to B-479. Annex A shows how the members responded to the specific questions which were included as a response form, plus additional comments.

Andrew and I have worked our way through all the responses, reviewing all the comments, and have amended the draft again as we believe to be appropriate. Most of the questions on the response form received a unanimous, or near unanimous, 'Yes'. Our conclusions on the specific questions are noted on Annex A, in red.

We apologise for missing the question about beacon colours (B-455.4) from the response form in the last round. US and AU have commented (see Annex A) and we have tried again to accommodate views expressed. We have followed the convention at INT1 J12.1 for the use of the '/' symbol to separate the colours. The proposal is significantly changed, so please consider it carefully, as requested by US.

At B-470.6, we have clarified the guidance on light flares superimposed on black lines, at the request of AU, and will amend the graphics (eg at B-475.6) at the next opportunity. We would be interested to know if this is an issue for producers of multicoloured charts.

In addition to the above, some other points were raised and are listed below the table in Annex A. These have all been considered carefully and where necessary the draft has been amended, with a marginal explanatory comment. As usual, we invite you to study the track changes in Annex B and advise us if you do not agree with what we hope is the final draft before submitting it to IHO Member States for approval.

**There is no need to respond to this letter, but if you do have further comments, please send them to the Secretary by 30 June 2008**.

Yours sincerely,

Peter G.B. Jones,
Chairman

Annex A: Summary of responses to CSPCWG Letter 6/2008
Annex B: B-450 to B-479 draft, fourth round (sent separately).

**Annex A to CSPCWG Letter 08/2008**

**SUMMARY OF RESPONSES TO**

**QUESTIONS ARISING FROM THE RESPONSES TO CSPCWG LETTER 6/2008**

| Specification | Question | YES | NO |
|---|---|---|---|
| B-450 | Do you agree with AU suggestion to change b, c and d from 'should' to 'must'?<br>*AU: AU still feels that these should be "must", but if this is not being universally applied and the consensus is NO, will not pursue this any further.*<br>*NO: NHS would like to keep the 'should'.*<br>*Chairman: approved, in the interests of standardization* | AU, BR, CA, DE, DK, ES, FI, FR, GR, IT, JP, NL, *NZ, PK, SE, UK, US, ZA | IN, NO |
| B-450.2 | Do you agree with the revised 'table' of colours?<br>*Chairman: approved* | AU, BR, CA, DE, DK, ES, FI, FR, GR, IN, IT, JP, NL, NO, *NZ, PK, SE, UK, US, ZA | |
| B-456.3 | Do you agree to make symbols Q102.1 and Q102.2 obsolescent? (For more details see comment in text in Annex C of CSPCWG Ltr 06/2008).<br>*AU agrees with comments in text in Annex C.*<br>*FI: The picture in current version of M-4 is very similar to standard Finnish leading marks case. The boards may have stems, but they are irrelevant and often obscured by trees. However, leading marks would in this case be shown as in Q120, so Q102.2 may go.*<br>*FR: Yes for Q102.2. For Q102.1 see B-463.2*<br>*Chairman: paragraph & symbols deleted. We do not consider Q102.1 worth keeping: appropriate topmarks (including non-IALA ones) can be added as necessary to Q80, in the style of Q82, where topmarks are required on leading beacons.* | AU, BR, CA, DE, DK, ES, FI, FR (see note), GR, IT, JP, NL, NO, *NZ, PK, SE, UK, US, ZA | IN |
| B-456.4 | a. Do you agree with the inclusion of occasional example pictures in M-4, such as this Norwegian 'Varde' (and the buoy at B-460.3)?<br>*Chairman: approved* | AU, BR, CA, DE, DK, ES, FI, FR, GR, IN, IT, JP, NL, NO, *NZ, PK, SE, UK, US, ZA | |
| | b. Do you agree that the picture shown is an example of a BnTr? (please refer to the discussions by NO, AU and UK in Annex A)<br>*Chairman: See also comments and pictures below.* | AU, BR, CA, DE, DK, ES, FI, FR, GR, IN, IT, JP, NL, NO, *NZ, PK, UK, US, ZA | SE |
| B-460.7 | Do you agree with the new specification for 'retroreflectors', as proposed by AU?<br>*AU: Suggest removing "these" from the second last sentence, but otherwise very good.*<br>*Chairman: approved* | AU, BR, CA, DE, ES, FI, FR, GR, IN, IT, JP, NL, NO, *NZ, SE, PK, UK, US, ZA | DK |

| Specification | Question | YES | NO |
|---|---|---|---|
| B-461.5 | Do you agree with the new paragraph for charting two opposing directions of buoyage, as proposed by UK?<br>*AU: Have made a couple of editorial corrections in the text.*<br>*CA: we put a note on the chart in the vicinity of the change of direction which explains the change of buoy direction at a certain point.*<br>*Chairman: there is no objection to a HO adding a note if required.* | AU, BR, DE, DK, ES, FI, FR, GR, IN, IT, JP, NL, NO, *NZ, PK, SE, UK, US, ZA | CA |
| B-462.2,<br>B-462.3<br>B-462.4 | Do you agree with the FR suggestion to add: '…so the conical/can/spherical buoy should only be used where this applies.'?<br>*AU: This is not information for cartographers, but rather is information for authorities responsible for buoyage. AU agrees with UK comment in Annex C that if the shape of the buoy does not conform to the convention (eg IALA) it should still be charted as it is in the real world. Additionally, the statement(s) conflicts with the last sentence in the first paragraph of B-462 regarding the shapes of special marks.*<br>*CA: not necessary to have this additional note.*<br>*FR: a link should be made between FR suggestion and AU proposed new specification (B-462.10).*<br>*SE: Ice conditions in Sweden force the use of conical buoys.*<br>*Chairman: Split vote. Agree with AU, but have drafted a modified specification to assist chart compilers.* | BR, DK, FR, GR, IN, IT, JP, NL, *NZ, PK | AU, CA, DE, ES, FI, NO, SE, UK, US, ZA |
| B-462.10 | Do you agree with the AU proposed new specification (noting that if approved, some editing would be required)?<br>*AU: I have had a bit of a go at formatting and some minor editing in Annex C. More would be required.*<br>*US: B-462.10 is a nice reference. Would the inclusion of B-462.10 necessitate the re-consideration of B-464 "Colour of buoys (and beacons)" and B-464.3 "Abbreviations for multiple colours on buoys and beacons"? Are these sections redundant?*<br>*Chairman: unanimous decision, but disagree with location at 462.10 (as 462 is limited to buoy shapes). Redrafted and added to B-461.3), which already has brief paragraphs for each type of IALA mark.* | AU, BR, CA, DE, DK, FI, FR, GR, IN, IT, ES, JP, NL, NO, *NZ, PK, SE, UK, US, ZA | |
| B-462.10<br>Please vote for one only of a, b, or c. | a. Do you agree that the 'summary table' suggested by AU would be useful? <u>or</u><br>*a-c. Chairman: Slight preference for a table, and as the graphic is available in INT1 anyway, we have prepared an easier to use version of the table in a new entry at B-467.* | CA, DK, ES, FI, NO, SE, PK, US, ZA | FR |
| | b. do you consider INT1 Q130 to be adequate? <u>or</u><br>*AU: It is a compilers guide as well as a user guide, so should be in both M-4 and INT1.* | ES, GR, IN, UK | |

| Specification | Question | YES | NO |
|---|---|---|---|
| | c. would you prefer Q130 to be inserted in M4 in preference to the table?<br>*AU: This is a great idea – a graphical representation should always be preferred, although there would need to be some consistency checking done, eg in INT1 Q130 the wording is "cylindrical (can)" but in M-4 is "can (cylindrical)"* | AU, BR, DE, ES, IT, NL, JP | |
| B-463.2 | Do you agree with the proposed new specification about leading beacon topmarks?<br>*AU: Suggest adding an additional sentence stating that these structures could also be daymarks.*<br>*FR: But Q102.1 symbols are useful as examples.*<br>*Chairman: approved.* | AU, BR, CA, DE, DK, ES, FI, FR, GR, IT, IN, JP, NL, NO, *NZ, PK, SE, UK, US, ZA | |
| B-478.3 | We would be interested to hear how different HOs address encoding groups of synchronized lights in ENC.<br>*See comments below.* | | |

Further general comments (with Chairman's remarks in red)

**AU:** (also included track-changed Annex C in case it might be useful - it has incorporated all the AU comments in the response, plus some minor formatting changes). This has been used as the basis for the new draft.

B-450: Amend a., b., etc to bold for consistency. AU will concede to Andrews comment on b-d.

B-450.2: In the table, suggest heading be "INT1 Reference" rather than "INT1 number". If you decide to retain "number", use capital "N" to be consistent with "Abbreviation".

B-450.4: Amend to "IALA Maritime Buoyage System" for consistency.

B-451.1: In round 2, AU suggested that whether to chart a fog signal partly depends on its probable range (other factors include, for eg, chart scale and clutter). The first sentence still implies that the probable range is the only factor to take into account. See revised draft.

B-455.4: AU still has a problem with the last sentence. In some parts of AU waters, the relevant authority has painted the structures of their lateral beacons grey, as this saves them a considerable amount of money. The only part of the aid that complies with IALA is the topmark (and the light if fitted). If AU was to comply with the last sentence of B-455.4 as it is, then all of these beacons would not have a colour as grey does not have an international abbreviation – AU would prefer to retain the colour of the topmark in this case. Suggest wording similar to "Where the structure and topmark are coloured differently, the colour that best represents the purpose of the beacon must be charted.". Also, the last 2 sentences need to be re-formatted to 10.5 pt. See revised draft.

B-455.8: Comment is that this clause has been revised following responses to round 2, but I cannot see any change from the round 2 wording. Add "Maritime Buoyage" to IALA. No change, the comment was left in error.

B-456.4: a., b., etc changed to bold text to be consistent with the rest of M-4. In (a), insert space in "Bn Tr" abbreviation? (Am not sure whether this is correct, as the description in Q110 has a space but in W there is no space – INT1 Sub-WG to note). There should be no space (as LtHo), latest versions of INT1 are correct.

B-457.1: AU continues its objection to the removal of the word "small" in relation to light stars. There was no consensus to add it at the earlier round. So it was not a removal; it has never been in M-4, only in the draft.

B-457.2: AU still does not agree with the "must" here (refer to comment in round 2 text). The INT symbol for a light star does not contain buff. The specification has not been changed (it was 'shall' before). If the mariner cannot navigate within recognition of the beacon at chart scale, then he would also not be able to see a rock, if the islet was so small that no coastline could be shown; all he needs to know is that there may be a light visible at night from some distance away.

B-457.3: Agree with re-worded description of lighthouses. Suggest inserting a comma after "lights" in the first line.

B-458: The new wording is as close as I have seen to clearing this clause up. My opinion has always been that all beacons serve a purpose (otherwise why are they there?), so the new opening sentences cover this nicely. One minor amendment – leading topmarks/daymarks are mainly triangle shaped, not conical.

B-460.1: Regarding the AU comment in the round 2 text, can the last sentence be changed to "This is generally the mean of the flood and ebb positions, and the position to which the mooring will be returned if it is found to have been dragged away."? No, it is the buoy that drags the mooring (see 3rd sentence).

B-460.4: Is there any resolution to the AU comment in round 2 regarding the spelling of superbuoy (or super-buoy, super buoy)? Also, a., b., etc changed to bold text to be consistent with the rest of M-4. One word.

B-461.3: a., b., etc changed to bold text to be consistent with the rest of M-4.

B-464.1(c) and (d): Suggest re-wording to be consistent with (a) and (b) above (refer to AU version of Annex C). Done

B-470.2: Suggest adding "(LL)" after the name in the first paragraph. No - LL is abbreviation for Lights List (not for M-12)

B-470.4(b): Block justify text.

B-470.5: Position of lights – special cases, bullet point 2. AU still has an issue with this bullet point, as we would prefer to use the light star in many circumstances. Refer to comments from round 1. See revised draft.

B-470.8: In the new last sentence, is "device" the correct word? Suggest "portrayal" may be better?

B-471.5: AU has concerns over the use of the abbreviation "LL" in a clause without the full terminology being used in the first instance in the clause (the well initiated cartographer may know what LL means, but for new users of M-4 it may be confusing). Suggest using "List of Lights and Fog Signals (LL)" in line 1 of 2nd paragraph. We have used the full title the first time it appears in a section, with (LL) following, and after that used the abbreviation. This is a normal convention and removes unnecessary repetition.

B-471.6: As for B-471.5 above.

B-471.7: As for B-471.5 above.

B-473.6: Amend end of sentence to read ", eg:" to be consistent with previous clauses.

B-478.3: [AU's ENC practice transferred below.] I agree with the round 2 AU comment that the sentence dealing with ENC should be deleted, as this is a paper chart specification, not ENC. Also, a minor editorial – delete the "s" on the end of "Lists" in the second last sentence for consistency.

**CA:**

B-455.1 In ENCs, the daymark must have a supporting structure – i.e. BCNSPP would be the master and DAYMAR would be the slave. The daymark can not exist without the supporting structure. This is a paper chart specification and the S-32 definitions have been quoted.

B-455.4 Agree. Too confusing to have 2 colours, just show the colour of the beacon (the prominent feature).

B-455.5 Agree – add when purpose is unknown to 455.5.

B-455.8 Disagree – leave buoys as is and only add radar reflectors to beacons when applicable – too much clutter and maintenance. We agree; there is no difference of opinion, it is what the specification says.

B-456.2 Canada has separate symbols for speed and cable notice boards – see Canadian Chart 1 Ub for speed limit indicator and Qv for cable sign symbols

B-457.3 Canada uses LNDMRK for lighthouses and BCNSPP or BCNLAT for lights.

B-458 Canada uses BCNGEN only for beacon where description and purpose is unknown. BCNSPP is used as a light support (i.e. post, pole, mast, lattice, tower) where the tower does not hold a colour of lateral significance. If the tower holds a colour of navigational significance, we use BCNLAT.

B-459.2 Agree – should delete Note in B-465. Buoyant beacons should be treated as beacons and refer to B-455.8.

B-462.2 to 462.7 Agree – colour is important for all buoys – conical buoys are red and can buoys are green. This must be included in specs.

About the IALA table: Why does the header starting with 'Feature' go between port and starboard marks for IALA B? Agree with the idea of the table to summarize information.

B-463.1f Agree – adopt the cross.

B-464.1a Agree.

B-464.1b Agree.

B-464.1e Agree.

B-464.3a: Agree.

B-470.5 Generally water towers, stranded wrecks and wind turbines do not have navigational lights, but rather Air Obstruction lights. Would rather see RLts or WLts instead of light flashes. Covered at B-476. B-470.5 deals with the case of a navigational light which has been mounted on another structure rather than having its own purpose built structure. Not common, but they do occur.

B-470.6 Canada has 468,3a Location of Light Flash, which shows the order of preference of the orientation of the flash on a buoy. 470,6 indicates: Note that the base of the flash emanates from the light dot.

THE ORIENTATION OF FLASHES shall normally be parallel with the left and right neatlines of the chart. However, they may be slanted either to the left or the right to a maximum of 45° off the vertical to avoid obscuring other detail. This seems unnecessarily restrictive. The specification allows flares to be oriented anywhere in 360°; if particular HOs wish to be more restrictive on their charts, that is their prerogative.

B-470.7 Disagree with the idea of putting names of the lights on the chart – leave it for the List of Lights book.

B-470.8 Would like to see diagram, but not sure if agree with the idea. In general, lights off of chart limits should be apparent when using overlapping charts and no additional chart work should be required. It only adds clutter to the chart. But is very useful to navigators in some circumstances.

B-471.1 Canada has Occasional and Private lights listed under 471.1 and direct the cartographer to 473,2.

B-471.2 Disagree – would be confusing to the mariner. You need the 'L' to signify flashing as opposed to fixed.

Note that the S-57 attribute SIGSEQ commences occulting lights with the eclipse, whereas all others commence with a light. But why? Did S57 simply follow INT1?

B-472.2 See 471,8 where two or more lights disposed vertically or horizontally – use (vert) or (hor). We do have these kinds of lights to deal with.

Why is the order of omission of light characteristics different between major (472,1) vs. minor (472,2) lights? They should be identical. Because range is very important to vessels at sea searching for major lights, but is of little importance when navigating close to the light (eg in the harbour).

If trying to abridge characteristics, this note is okay for along shore/wharf.

B-473.1 Agree

B473.7 F.Y(exting): exting (to represent an extinguished light) this could be a misleading abbreviation. Extinguished does not come to mind when I see this. Currently in CHS we either delete the light or issue a (T) notice. We are trying to get away from issuing (T) notices so at times this label could be useful. would like to see 'extngh' or 'extgh' . The abbreviation 'exting' has been used by some nations for many years and was recently approved as an INT abbreviation. Most abbreviations use the first few letters, unless that could mean something else; in this case, no other WG members have suggested 'exting' is confusing and we believe it is more readily understood by non-English speakers.

B-475.2 Example given for P46 is acceptable.

B475.8 Currently, we chart them differently than IHO with no magenta triangle and use a note instead. Recommend IHO spec. says "shall" instead of "must" This is not a new symbol, it has been accepted as an INT symbol for years.

B478.3 Agree with additional information to be adopted.

**NZ:** We have reviewed the documentation, and advise that we are comfortable to proceed with the amendments to M4 being discussed.
*[We assume this means a 'Yes' vote to all questions above, but cannot place NZ in B-462.10a,b or c].

**US:**
**B-455.4** This re-written specification was not included for voting in this annex. I request that all members take another look at B-455.4 from CSPCWG Letter 3 and provide comments. Maybe things are different in other counties, but in the U.S., the colour of the supporting structure for a beacon has absolutely no lateral significance. The daymark on the structure has lateral significance. The light on the structure has lateral significance. The topmark on the structure has lateral significance. But in this part of the world, the structure is likely to be an unpainted pole or a rusty steel skeleton or painted black or grey. To chart the colour of the structure on a paper chart would only serve to confuse the mariner, as pointed out in round 2 by AU and NO. How would the mariner differentiate between the charted colour of the daymark and the charted colour of the pole that it is attached to? A red daymark on a white pole would be RW which means safe water, instead of keeping to the left when returning to the harbour. This spec. needs re-consideration. Please see new draft.

**Comments on the** charting **of synchronized lights on ENC**

**AU:** AU links synchronized lights in ENC using the collection object C_AGGR, and on the individual lights the attribute STATUS is populated with the enumerant 15 (synchronized). The problem with the collection object is that most ECDIS do not do anything with them (ie users cannot select them or query them to find out which objects are in the collection), therefore from a users perspective the C_AGGR is of no use – the user cannot easily identify which lights are synchronized with which. I agree with the round 2 AU comment that the sentence dealing with ENC should be deleted, as this is a paper chart specification, not ENC. Also, a minor editorial – delete the "s" on the end of "Lists" in the second last sentence for consistency.
**BR:** Encoding groups of synchronized lights are still under study.
**DE:** At the time a workshop for harmonizing ENCs for the Baltic Sea is in progress but synchronisation of lights hasn't been a topic so far. In case of synchronized lights BSH sets the light attribute STATUS to 15 (synchronized). In opposite to other HOs we don't create aggregation objects. For buoys we haven't used it yet.
**DK:** We use the attribute status no.15 (synchronized). All the LIGHTS which are synchronized are joined together in aggregation C_AGGR. [Collection object class: aggregation].
**ES:** Groups of synchronized lights are linked as an object C_ASSO. [Collection object class: association].
**FI:** Possible synchronization is not encoded at the moment.
**GR:** We do not have any synchronized lights.
**IN:** Synchronized lights are not a mandatory attribute for ENC. So far same has not occurred in Indian ENCs.
**IT:** Encoding groups of synchronized lights are not yet in use in Italy.
JP: JHOD does not encode synchronized lights in ENC.
**NL:** encoding groups of synchr. lights not yet in use
**NO:** Synchronized lights are on trial status at the moment (in Risøyrenna, northern Norway). We have not encoded any of these yet.
**PK:** Only leading lights are captures as group of objects for aggregation
**SE:** Sweden do not show whether or not lights are synchronized in our ENC:s. No aggregations are done for these lights.
**UK:** UK does not currently encode the STATUS = 15 (synchronized) to LIGHTS objects within ENC's. UK encoding policy is to follow the source chart for attributing objects, only adding mandatory attributes where not charted to ensure S-57 compliance. UK encoding policy for LIGHTS objects does not include the addition of Col 8 of LL information apart from the mandatory sector values. When the new abbreviation appears on charts used as the source for ENC's, the attribute will be added as a matter of course. In most cases I have observed the synchronized lights form a pair on a lead and as such will be grouped by means of a C_AGGR (aggregation).Where synchronized lights do not form a leading pair, these could be grouped using a C_ASSO (association). This object is not currently in use by UK. If it is considered that the inclusion of the attribute STATUS = 15 (synchronized) has significant benefits to the end user EP can raise an encoding change, in advance of the abbreviation appearing on the source charts, to add the value as part of the standard maintenance routine.

**U.S:** With tens of thousands of aids to navigation, the U.S. has only two lights that have been identified as being synchronized. The "status" feature object attribute (2.197) is populated with input ID #15, "synchronized".
**ZA:** None of our lights are synchronized yet. A discussion with our ENC expert revealed that should we need to they would be encoded as:

STATUS = 15. Synchronized lights may be associated using the collection object C_ASSO.

Thank you for all this advice. It does not directly affect paper charts, but we will pass to the Chairman of TSMAD for consideration of making more consistent advice for ENC.

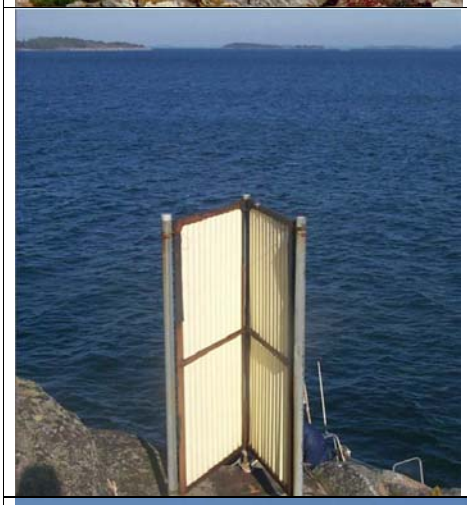
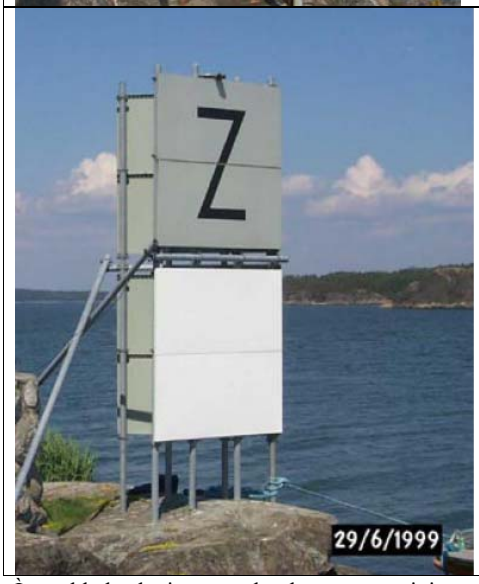
**Further Comments and Pictures on Beacons, Beacon Towers and Cairns**

**FI:**

- Regarding cairns and beacons. Like NO, we also consider cairns as navigationally important, maybe not for large merchant vessels, but for any one else. But as I see it from other comments, this is more an issue of what a cairn is and what it is not. We are used to translate cairn to kummeli in Finnish. But kummelis have been built and are still built for navigation purposes only [But the reverse it true of cairns, so cairn is not a good translation of kummeli. Also, cairns always consist of piles of stones.]. A kummeli may be an old pile of stones, a smallish concrete structure, a board of glass fibre or almost anything, but they all have the same navigational function. They all used to be charted with  in old traditional Finnish charts, but were replaced with the international Q100 on new INT style charts. Only board-like kummelis are still shown with traditional symbol because they are so different by appearance from the symbol. I know that many of our kummelis could qualify as beacons, but I still would not use beacon symbols for them for two reasons – 1) they serve a different purpose than the beacons currently shown as beacons [but a beacon 'is a generic nautical term for a specially constructed object forming a conspicuous mark as a fixed aid to navigation' – B-455.1, so in what way do they serve a different purpose?].and 2) the fairway authority, who is responsible for navigational aids, classifies them as kummeli without necessarily giving any additional information making it difficult for the cartographer to know how each of the 2500 kummelis actually looks like [this is what the 'beacon in general' symbol is for, ie 'where the actual shape of the beacon is unknown' – B455.5]. We would not like to see actual cairns to be portrayed as beacons (Q80).

The following images show different navigational aids that the fairway authority has classified as kummeli and how they are shown on our charts today.

| | |
|---|---|
|  | Shown as  <br><br>Vertical length 1.5 m<br><br>Chairman: this looks like a painted cairn, so I would be happy with the selected symbol. However, if it is deliberately constructed for navigation, then Q80 or Q110 may be more appropriate.<br><br>In all cases, where the cartographer knows what is to be portrayed, then he has to judge which of the available symbols best conveys the real-world feature to assist the mariner in identifying what he actually sees. If the cartographer does not know what it looks like, then Q80 is available. |

| | |
|---|---|
|  | Shown as  <br><br>Vertical length 1.8 m<br><br>Chairman: to me, this is undoubtedly a beacon tower (Q110) and the symbol is intuitive, which Q100 would not be. |
|  | Shown as <br><br>Vertical length 2 m<br><br>(The seaward face has similar surface as the backside seen here.)<br><br>Chairman: the most generic term for this, and the next one, is a 'Daymark' ("The term 'daymark' may also simply refer to any unlighted aid to navigation – B-455.9"). But there is no specific symbol for a daymark which is not **part of** a beacon or buoy (such as a topmark), so the only suitable symbol is Q80 – and they actually look like the symbol! |
|  | Shown as  <br><br>Vertical length 3.9 m<br><br>This is the most modern version of kummeli made from aluminium board with an identification character in the upper part and reflective surface on the lower part. The identification character varies and is presented on the charts as shown above.<br><br>Chairman: I would chart this as Q80, with 'Z' alongside.<br><br>In all these cases, the vertical length could be shown by E5, if thought to be useful. |

Ì would also be interested to hear your opinions. How would you portray these?

**NO:** To be changed: Tower beacons: in the order of 10 metres in height. Ref Chris [or Jeff?].
**SE:** SMA agree with the answer given by Australia. However in Sweden we do have similar features as in Norway but do not make any difference between larger and smaller beacons. The importance of this type of older fixed beacons has decreased. The symbol Beacon in general (Q80) is always used in Swedish charts.

## B-450 AIDS TO NAVIGATION, AUDIBLE (SOUND) AND VISUAL: GENERAL

In the following paragraphs, aids to navigation refer to man-made features specifically constructed to assist navigation. Audible (sound) and visual aids are ~~considered as~~ divided into the following categories ~~listed below~~:

**a.** Fog signals, which are usually associated with a lighthouse, major floating light or buoy. Associated lettering ~~of the abbreviations for fog signals~~ may be upright or sloping, depending on whether the supporting structure is fixed or floating.

**b.** Beacons, cairns, towers, and minor fixed marks, specially erected for navigational purposes. Associated lettering must be upright.

**c.** Buoys, including minor light floats. Associated lettering must be sloping.

**d.** Major floating lights. Associated lettering must be sloping.

**e.** Lights on fixed structures and lighthouses of all sizes. Associated lettering must be upright.

For electronic aids to navigation, see B-480 and for signal stations, see B-490.

**B-450.1** **A**ids to navigation ~~shall~~ have **international abbreviations** ~~when used~~ for:

- Colours of lights exhibited and colours of structures (ie the bodies and/or topmarks of buoys and beacons and, where required, lighthouses); see B-450.2. In certain cases, as described under the different types of aids to navigation, colour abbreviations may be omitted.
- Types of fog signals; see B-452.
- Characteristics of lights; see B-466.2 and B-471.

~~In certain cases, as described under the different types of aids, abbreviations may be omitted.~~

**B-450.2** **The international abbreviations for colour are**:

| Colour | INT1 Abbreviation | INT1 Reference | |
|---|---|---|---|
| | | Light | Structure |
| White | W | **P11.1,** | **Q5** |
| Red | R | **P11.2,** | **Q3** |
| Green | G | **P11.3,** | **Q2** |
| Blue | Bu | **P11.4** | |
| Violet | Vi | **P11.5** | |
| Yellow | Y | **P11.6** | **Q3** |
| Orange | Or | **P11.7*** | |
| Amber | Am | **P11.8*** | |
| Black | B | | **Q2** |

*Orange and amber lights may be charted as 'Y'.

Colour abbreviations must be in capital letters in all cases except for the second letter of two-letter abbreviations. These abbreviations must be used for the colours of lights and structures.

**Multicoloured structures.** Where the colours are in bands, the sequence of colour abbreviations must be from top to bottom. Where the colours are in stripes (vertical or diagonal) or the sequence of horizontal bands is not known, the darker colour must be given first.

For the application of colours to fixed and floating aids to navigation, see B-464.

**B-450.3** **Legends and abbreviations associated with aids to navigation** should be inserted as close as possible to the symbol, but clear of any coloured circles around it if possible. They should also be placed clear of navigationally important detail, eg outside the navigation channel for lateral buoys if possible. Legends should usually be arranged in the following order:

| | |
|---|---|
| Light description, eg: | *Fl.G.3s* |
| Fog signal | *Whis* |
| Any designation | *No 2* |
| Electronic aid (in magenta) | *Racon(Z)* |

For **major fixed lights**, the name (if named separately from the feature on which it stands), may be the most important detail, and should be at the top of the list, see B-470.1 and B-470.7.

Designations should ideally be as shown on the structure, see B-455.7 and B-460.6.

Abbreviations for the colour of structures must be placed under the symbol if space permits.

**B-450.4** **For information about buoyage systems**, including the IALA Maritime Buoyage System which may also apply to fixed marks, see B-461.

**B-450.5** **Charting considerations.** Charted aids to navigation should normally be updated by Notice to Mariners. Details that are of little or no use to the mariner should not be charted, as this may result in unnecessary chart maintenance and/or chart clutter. Whether to include particular aids to navigation and their detailed description must be part of a general assessment on how to portray an area at the chart scale; they should not be considered in isolation. For example:

- It would be inconsistent to include buoys in the upper reaches of an estuary if the depths were not shown in sufficient detail to navigate in that area of the chart. However, lights with ranges that will make them visible in areas that are navigable when using the chart should be included.
- If it is known that a channel is stable and the aids to navigation rarely moved or changed, they should be considered for inclusion on charts. However, if they are subject to frequent change it may be better to omit them, especially on smaller scales. In such cases, consideration should be given to the inclusion of a legend, eg:

*Channel marked by buoys and/or beacons*

When considering the omission of aids to navigation from smaller scale charts, the following should be taken into account:

- Vessels may not carry all the largest scale charts but may be forced by circumstance (eg adverse weather, equipment malfunction) to approach the coast, perhaps to shelter in a bay or to reach a port or harbour, on a smaller scale chart.

- Though pilotage may be compulsory, the master is responsible for the safety of his vessel and should be provided with enough detail to safely monitor the performance of the pilot or to take over if necessary.

- If the chart is of sufficient scale to be used in an emergency, at least the principal aids to navigation should be shown, with the most important details (see B-472).

## B-451 AUDIBLE (SOUND) FOG SIGNALS

The term 'fog signal' refers to the sound emitted, not the apparatus. Fog signals are ~~fairly~~ short range aids to navigation, principally as hazard warnings. For various reasons they are unreliable as indicators of position. Their importance relative to other aids to navigation has declined but they are still considered useful for the safe navigation of vessels with very limited (or non-functioning) electronic equipment~~, and also of well-equipped vessels whose equipment is not functioning~~.

Brief details of the type and characteristics of fog signals may be shown on charts on which vessels may navigate within range of the fog signals. The type of fog signal should be indicated by a legend (see B-452), at least on buoys (see B-454).

If it is appropriate to show only the existence of a fog signal on charts, without specifying the type of fog signal, it must be portrayed by the ~~should do so preferably by using the~~ magenta symbol (see B-452.8):

**R1**

Fog signals on shore are usually described in List of Lights and Fog Signals (LL), unlike fog signals carried by buoys, which are not always listed in LL.

For ~~charting of~~ fog detector lights, see B-477.

For more details of fog signals, see IHO publication M-12 'Standardization of List of Lights and Fog Signals'.

**B-451.1** **Whether to chart a fog signal.** A fog signal may be shown on charts on which vessels may navigate within range. Therefore its inclusion depends, in part, on some definition of its probable range. IALA defines the 'usual' range of a fog signal as:

> 'the distance at which, in foggy weather, an observer has a 50% probability of hearing a sound signal when he is situated on the wing of a ship's bridge [on a vessel with an average ambient noise level]… in relatively calm weather, with no intervening obstacles'

Although not precise enough to chart, for the guidance of cartographers, the following 'usual' ranges are assumed;

- Powerful diaphone: 4 to 5 miles,
- Horn: up to 3 miles (but signals at harbour entrances are usually much weaker).
- Wave actuated bell or whistle: about 1/2 mile or less.

As the importance of fog signals has declined, they should usually be the first aid to navigation omitted in areas where chart clutter becomes a problem.

**Commentaire [c1] :** Clarification suggested by AU

**B-451.2** **The position** from which a fog signal is emitted is usually on a buoy, or close enough to a light ~~as~~ to be treated as sounded from the same position as the light. In cases where a fog signal is **not** closely associated with a light, its position should be shown by a small position circle and the magenta symbol **R1** (see B-451), with the type and/or name added if appropriate, eg:

Siren(1) **R1**

**B-451.3** **Abbreviations** for type, characteristic and period of a fog signal are the same for all **automatic** signals, whether ashore or afloat. For wave actuated signals on buoys, see B-454.1.

**B-451.4** **Reserve fog signals,** eg a gong sounded when the normal siren is not functioning, should not ~~normally~~ be charted. For wave-actuated signals on buoys sounded in conjunction with automatic signals, see B-454.3.

## B-452 TYPES OF FOG SIGNAL

It is impossible to indicate on charts all the variations in the sounds emitted but some major differences can ~~easily~~ be conveyed to the mariner by distinguishing the following types of fog signal.

If it is required to include the type of fog signal, ~~Where a nation states the type of fog signal on its charts,~~ the following **international abbreviations** or legends must be used. To avoid clutter, where a fog signal is co-located with another aid to navigation, the fog signal legend or the symbol **R1** should be shown, but not both.

**Commentaire [c2] :** INT editors please note need to delete R1 at R20, 21 and 22, also amend note 'may' to 'should'.

**B-452.1 Explosive:**

Explos **R10**

A sound signal produced by the detonation of an explosive charge. It is ~~now~~ mainly used as a reserve signal and, if so, should not to be charted.

**B-452.2 Diaphone:**

Dia **R11**

A generally powerful, one or two-tone ~~lowpitched~~ sound (a one-tone sound ends in a suddenly lowered pitch known as a 'grunt'). It is produced by release of compressed air ~~controlled by a piston actuated by compressed air~~.

**B-452.3 Siren:**

Siren **R12**

A sound produced by the release of compressed air through a rotating disc. Power and pitch vary considerably; it may emit a wailing sound.

**B-452.4 Horn:**

Horn **R13**

A sound produced by a vibrating membrane or reed within a tube, it varies greatly in strength and pitch. The nautophone, reed, tyfon and klaxon are types of horn.

**B-452.5 Bell:**

Bell **R14**

A ringing sound with a short range. The apparatus may be operated automatically ~~, by hand,~~ or by wave action.

**B-452.6 Whistle:**

Whis **R15**

A shrill sound made by releasing compressed air or steam across an opening. The apparatus may be operated automatically ~~, by hand,~~ or by air being forced up a tube by waves acting on a buoy.

**B-452.7 Gong:**

Gong **R16**

A sound produced by vibration of a disc, or discs, when struck. The apparatus may be operated automatically ~~by hand,~~ or by wave action.

**B-452.8 Type of signal not stated.** In these cases, the magenta symbol **R1** (~~three arcs of concentric circles within an angle of 45°,~~ oriented and placed as necessary for clarity) must be shown on the appropriate scale charts (see B-451.1). Examples of its use, alone or in conjunction with other aids to navigation are given below:

| Alone | With floating navigational aids | With shore lights | With electronic aid ~~radio station~~ |
|---|---|---|---|
| | | Fl.3s | Rc Racon **R1** |

**Commentaire [c3] :** DID: please change Rc to AIS

~~**B-452.9 Submarine sound signals** are no longer used.~~

**B-453 FOG SIGNALS: RHYTHM AND PERIOD**

The characteristic rhythm of fog signals (other than those actuated by waves, which are irregular) may ~~well~~ be more important than their type when mariners are attempting to identify them. The number of sound emissions (eg blasts, strokes) and the period may be charted, ~~together with the period if thought useful,~~ as described below. ~~In cases where the symbol R1 is used, instead of an abbreviation for the type of signal, it is preferable **not** to give the characteristics of the signal (to avoid confusion with the characteristics of the lights with which most fog signals are co-located).~~

**B-453.1** **A single sound (blast)** repeated at intervals should be shown by '(1)' following the type of signal, eg:

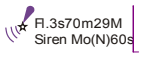
Horn (1).

Unless (1) is shown, it may not be clear to the mariner whether a single blast is implied or merely that the scale of the chart is considered too small to show the number of blasts. At a buoy, it also helps to distinguish from a wave-actuated sound signal, see B-454.1.

**B-453.2** **Multiple sounds (blasts)** (other than Morse or composite signals) repeated at intervals must be shown by '(2)', '(3)', etc, following the type of signal, eg:

Horn (3)

**B-453.3** **Morse code rhythms** must be shown by 'Mo' followed by the Morse letter in brackets, eg:




R20

**Commentaire [c4] :** DID: please delete the 3 arcs from the graphic.

Note: there is no R1 symbol included as the type of fog signal is shown; see B-452.

**B-453.4** **Composite rhythms** (other than Morse) where groups of blasts are sounded must be shown as the full sequence, eg:

Siren (2+3).

**B-453.5** **The period** of a fog signal is the time taken for a complete sequence of sound emissions. Where space permits, it must be charted for major signals (and on the largest scale charts for minor signals where considered useful) following the number of blasts. The period must be given in seconds, even for periods of one minute or longer, eg:

Dia(1)30s Horn(2+3)90s.

**B-454 FOG SIGNALS ON BUOYS**

The existence of fog signals on buoys must be indicated, on appropriate scales (see B-451.1), by legends such as '*Bell*', '*Whis*' or '*Gong*' ~~rather than by the symbols for buoys' shapes,~~ or the symbol **R1** if there is no requirement to define the type of fog signal. For general characteristics of buoys, see B-460 to B-469.

**B-454.1** **Wave-actuated fog signals** have no regular rhythm and must be charted by a legend indicating the type of signal eg '*Bell*', '*Whis*', '*Gong*' against the buoy symbol, eg:

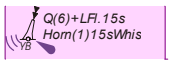

R21

**Commentaire [c5] :** DID: please delete the 3 arcs from the graphic

**B-454.2** **Fog signals operated automatically** should be charted ~~on appropriate scales (see B-451.1)~~ by a

legend which includes the number of blasts (or strokes) and the period~~, where space permits~~. Legends must follow the specifications in B-452 and B-453.

**B-454.3** **Wave-actuated signals in conjunction with automatic signals** should be charted as in the following example:




**R22**

Note: there is no R1 symbol included as the type of fog signal is shown; see B-452.

**B-455** **VISUAL AIDS TO NAVIGATION: BEACONS AND DAYMARKS, IN GENERAL**

The features described below are all types of fixed structures erected primarily in order to assist navigation by day. Most of these features (except leading marks) are included in the IALA Maritime Buoyage System (see B-461). The specifications for IALA floating aids to navigation are given in more detail from B-460 onwards but generally also apply to those fixed aids which are part of the IALA System.

For natural and artificial landmarks, see B-340.
For light beacons, see B-457.
For buoyant beacons, see B-459.
For topmarks, see B-463.
For colours, see B-450.2 and B-464.

**B-455.1** **The term 'beacon'** and equivalents, eg 'balise','bake' **(international abbreviation 'Bn')** is a generic nautical term for a specially constructed object forming a conspicuous mark as a fixed aid to navigation. Beacons include a wide range of structures from simple poles to built-up towers. There are numerous other terms for particular types of beacon, but for the purposes of international standardization, ~~it is recommended that~~ such features should be classified primarily by their appearance and represented by symbols rather than legends.

Beacons should be charted in sufficient detail on the largest scale charts to permit positive identification. Where the appearance is not adequately known to the cartographer, a symbol for a 'beacon in general' must be used; see B-455.5.

For an explanation of the terms **'daymark'** and **'daybeacon',** see B-455.9. The following specifications for beacons apply equally to daymarks and daybeacons.

**B-455.2** **Shapes of beacons.** Standardization regarding shapes of beacons applies principally to topmarks, permitting great variations in the shapes of supporting structures. Topmarks should be shown on at least the largest scale charts.~~Beacons painted in distinctive colours and those having special topmarks should generally be charted in sufficient detail on the largest scale charts to permit positive identification.~~

**B-455.3** **Symbols** and associated legends for beacons must be upright (except those on submerged or drying rocks, see B-455.6), to help distinguish them from floating spar buoys (see B-462.6), which are less reliable for position fixing.~~; see B-462.6. Except for impermanent features (see B-456.1 and B-456.2), each symbol shall includes a small position circle (without central dot).~~

**B-455.4** **Colours of beacons,** which are standardized in the IALA Maritime Buoyage System, must be indicated by the appropriate **international abbreviations** ~~as used for buoys~~ (see B-450.2 and for placement see B-450.3). For use of colours in the IALA System, see B-464. The colour(s) of a beacon is/are to be shown by symbol Q82. Where the structure and topmark are coloured differently, the colour that best assists the user in identifying the beacon should be charted. If it is useful to give the colour of both topmark and structure, then the topmark colour should be given

**Commentaire [c6] :** DID: please delete the 3 arcs from the graphic, and insert a space between 15s and Whis.

first, divided from the structure colour by a slash, eg for a red lateral topmark on a white painted beacon tower: R/W.

On multicoloured charts, the symbol (or just the topmark) may be shown in the actual colour, but the abbreviations will still be useful, as the colour may not be readily distinguishable under certain vessels' bridge lighting conditions.

**Commentaire [c7] :** Revised taking account of comments and suggestions by AU and US

**Commentaire [c8] :** Transferred from B-456.3, which has been otherwise deleted.

**B-455.5** The symbol for a **'Beacon in general'** is:

 **or**  **Q80**

and must be used where:

- it adequately represents the feature,
- when the scale is too small to show additional detail,
- where the actual shape of the beacon is unknown.

The symbol (without legend 'Bn') should be used if space permits.

**B-455.6** **Beacons on submerged or drying rocks.** Spars or poles placed on submerged or drying rocks should be charted as follows (topmark and rock symbol as appropriate), so that the rock symbol is retained, eg:


**Q83**

The symbol should be ~~shown~~ sloping to the right unless this is precluded by the need to avoid other detail.

**B-455.7** **Numbered or lettered beacons** should, on at least the largest scales, have the numbers or letters placed alongside in upright figures, where space permits, in the form painted on the actual beacons if known. However, if necessary for clarity (eg to avoid the risk of a beacon number being mistaken for a sounding) they may be surrounded by single quotation marks, or preceded by the abbreviation 'No' (for number) or equivalent. Where there is a sequence of numbered beacons, all the designations in the sequence should be depicted in the same manner.

**B-455.8** **Radar reflectors** are not generally charted on buoys and buoyant beacons within the IALA System as they are commonly constructed to be radar reflective, see B-465. However, beacons do not consistently have radar reflectors, therefore where it is known that a beacon has a radar reflector installed, it should be charted by the symbol  **S4,** placed above the beacon if space allows, eg:

**Q10**

**Commentaire [c9] :** DID: please insert Q10 symbol.

**B-455.9** **Daymark** refers to the identifying characteristics of an aid to navigation which are visible in daylight. On structures that are indistinct at the required distance, the aid is made more visible by affixing a daymark to the structure. It will have a distinctive colour and shape depending upon the purpose of the aid and must be portrayed by the appropriate colour abbreviation and symbol (eg topmark, leading mark, painted mark). If no specific symbol is appropriate, the 'beacon in general' symbol  or  **Q80** should be used. The term '**daymark**' may also simply refer to any unlighted aid to navigation. In North America, the term '**daybeacon**' is used for an unlit beacon. For charting daymarks outside chart limits, see B-470.8.

**Commentaire [c10] :** Additional clarification added, partly to cover AU comments on leading topmarks (B-463.2)

**B-456** **SYMBOLS FOR VARIOUS TYPES OF BEACON ~~OR DAYMARK~~**

**Commentaire [c11] :** DID: the symbols in B-456 appear to be fuzzy and small compared with 5011. Please check clarity and size.

Beacons conforming to the IALA Maritime Buoyage System should be represented by ~~an upright~~ 'supports' and topmark symbols similar to those used for IALA ~~System~~ buoys (see B-463.1) but ~~generally~~ upright instead of sloping (see B-455.6 for exception), eg:


~~Q81~~


**Q82**

The position of a beacon (except a painted mark, see B-456.2) is indicated by the centre of the base of the symbol, usually a small position circle.

For the associated colour abbreviations, see B-455.4.

The following illustrations cover 'non-standard' structures and indicate the type of structure on the left and the chart symbol (for the largest scales) on the right.

**B-456.1** **Minor impermanent marks, usually in drying areas.** Perches, withies, poles, etc, without topmarks and usually marking one or both sides of minor channels must, if required, be charted by symbols as shown below. Alternatively, a legend, eg 'Marked by poles', or equivalent, may be shown.

**Commentaire [c12] :** DID: the following symbols are contained in an invisible table. Please achieve a similar layout when converting to InDesign.

**Pole**   **Q90**

**Perch**   Port Hand  Starboard Hand **Q91**

The symbols for withy  (Q92) are obsolescent; Q90 or Q91 should be used instead.

**B-456.2** **Minor marks, usually on land**

**Cairns** (mounds of stones forming a memorial or landmark, typically on a hilltop or skyline) must, if required, be charted by the symbol below (on the largest scale charts). Cairns are not built for marine navigational purposes, but may occasionally be used as a transit mark, see B-433.

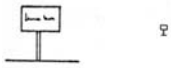
**Q100**

**Coloured (or white) marks** on cliffs, rocks, walls, painted boards etc, must, if required, be charted by a fine outline of the patch and the international abbreviation 'Mk', see symbol below. The actual colour may be shown, usually underneath, using the appropriate **international abbreviation**, see B-450.2. The position of the mark is indicated by the centre of the symbol.




**Q101**

**Notice boards** indicating speed restrictions, cable landings, etc, must, if required, be charted ~~scale permitting,~~ by the symbol below. For leading beacons in the shape of painted boards ~~should be charted as beacons with rectangular topmarks and position circles to indicate the precise position;~~, see B-456.3.



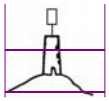
**Q126**

**B-456.3** Not currently used.

**Commentaire [c13] :** Removed after voting in round 3. One paragraph moved to B-455.4.

**B-456.4** **Beacons which are major structures,** ~~having a support as distinctive as the topmark,~~ should be charted in their true position by the symbols below, ~~charted in their true position as shown below,~~ or by pictorial sketch or image (size at compiler's discretion); see B-456.5, eg:

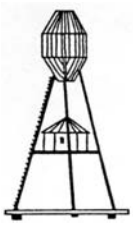
**a. Beacon towers** are major solid constructions of stone or brick, built for marine navigational purposes, often painted distinctively, eg:



I Q110

The example shown is a Norwegian 'varde'. Some beacon towers may have topmarks and/or lights added (see also B-457.1). The **international abbreviation** 'BnTr' may be used if space does not permit the symbol to be shown.

**b. Refuge beacon**. The symbol includes the **international abbreviation** 'Ref' ~~(T14)~~ alongside.





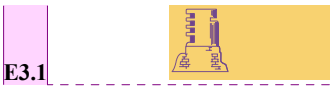
Q124

Note: This abbreviation should also be used for refuges in the Antarctic region (**T14**).

**c. Lattice beacon.**

Q111

**B-456.5** **Beacons with distinctive shape and colour** may be shown by a small pictorial sketch, in black, with a small position circle showing the actual position of the beacon. Alternatively, a small pictorial sketch or image may be placed nearby, normally in magenta but a different colour (other than black) may be used, and having no position circle at the base. ~~(~~The use of colour is necessary to indicate that the sketch is not in its true position~~)~~. If the sketch is placed some distance from the symbol (eg in a group of sketches), the name and geographic position of the beacon should be inserted in the same colour close to the sketch.



E3.1 E3.2

**B-457 LIGHT BEACONS**

**Commentaire [c14] :** DID please insert the picture, with a single open BnTr symbol alongside, with BW undermeath.

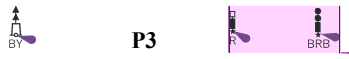
**Commentaire [c15] :** DID: please replace the rather fuzzy symbols by eps versions, in this whole section.

**Commentaire [c20] :** Noted for inclusion at B-370.8 (from CSPCWG2) and for consideration during revision of B-493.

**Commentaire [c21] :** DID: insert the same graphic as in the latest M-4 edition, but removing the lighthouse. Also include a black version with a small position circle at the centre of the bottom, with number E3.1 alongside.

Some structures which may primarily be considered beacons (particularly those marking leading lines) also exhibit lights. On large-scale charts important light beacons should be charted in such a way as to indicate the colour and shape of the features when used by day, in addition to showing the characters of the lights exhibited.

**B-457.1** **On large-scale charts** the same symbols as specified in B-456.3 and B-456.4 should be used for light beacons, but with light stars in place of position circles, except for beacon towers, eg:




**P3** **P4** (see also Q7 and 8)

The details of the light character must be charted in the usual way, see B-471. For details of the rhythms of lights for light beacons in the IALA Maritime Buoyage System, see B-466.2.

**B-457.2** **On smaller scale charts** on which navigation within recognition range of a beacon by day is unlikely, light beacons must be charted solely as lights (**P1**), unless the scale is so small that they should be omitted altogether.

~~BnTr~~ ~~**P3**~~ ~~Bn~~ ~~**P4**~~

**B-457.3** **Lighthouses,** ie structures built to house major marine navigational lights, ~~large structures with distinctive shape and colour,~~ must be shown as light stars (see B-470). As they are usually distinctive structures, in size, shape and colour, ~~but may in addition have~~ a small pictorial sketch may be placed nearby. It should normally be in magenta, but a different colour (other than black) may be used; see B-456.5.

**E3.2**

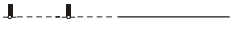
~~This practice is best suited to offshore lights.~~

**B-458** **SPECIAL-PURPOSE BEACONS**

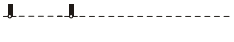
Special-purpose beacons are beacons which are not part of a cardinal or lateral system. They may conform to IALA special marks (see B-461.3), or to a national or other standard system, eg triangles placed point up on front leading marks and point down on rear leading marks. Full details (if known and if scale permits) should be shown on charts. However, if special-purpose beacons conform to a standard shape and colour throughout a nation's waters, they may be charted in less detail where an adequate description of the standard system is in the Sailing Directions (eg colour abbreviations may be omitted, or be charted simply by a 'beacon in general' symbol, Q80).

The functions of beacons marking leading lines, cables, outfalls or measured distance will be clear from the associated line symbols~~; this is~~, so ~~there is no need for such~~ legends such as 'Cable Beacons', 'Leading Beacons', or equivalents should not be added.

An isolated danger mark is an example of a special-purpose beacon which conforms to an international (ie the IALA) system. The following are some other examples of special-purpose beacons, the purpose of which is identifiable by reference to other charted features.



**Q120** Leading beacons



**Q121** Beacons marking a clearing line

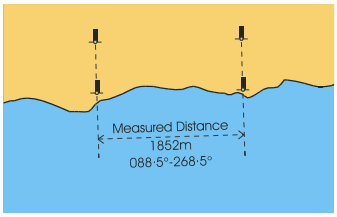
**Commentaire [c22] :** DID: please add version without topmarks or colour.

**Commentaire [c23] :** In view of AU comments, we suggest a 'beacon in general' example should be added to INT1 at P4 – INT1 editors please note (Q80 + star + flare).

**Commentaire [c24] :** It is only intended to delete the symbols with Bn or BnTr from this specification, because they contradict the wording. The symbols are still valid for use where it is possible to navigate within range of the daymark.

**Commentaire [c25] :** DID: insert magenta versions of the lighthouse sketch from existing M-4 B-456.5

**Commentaire [c26] :** Better not to show the topmarks in INT1 (and M-4) as these may vary. Covered in INT1 by note 'where scale permits'.




**Q122** Beacons marking measured distance with quoted bearings

**Q123** Cable landing beacon (example)

## B-459 BUOYANT BEACONS

**B-459.1** **A buoyant beacon** has a tall, spar-like body, fitted with a permanently submerged buoyancy chamber. The lower end of the body is secured to a seabed sinker either by a flexible joint or by a cable under tension. Other terms sometimes used for buoyant beacons include: resilient or elastic beacon, pivoted beacon, floating light beacon, Sarus tower and articulated light. The beacon usually carries a light and topmark and conforms with the rules of the IALA Maritime Buoyage System. A buoyant beacon has very little freedom of movement; it does not rise and fall with the tide and normally remains in a vertical or nearly vertical position, so should be charted as other beacons, not as buoys.

**B-459.2** **The symbols used for buoyant beacons** must be the same as those used for fixed beacons, eg:



**Q81**




**Q82**

**The symbols used for buoyant light beacons** must be the same as those used for fixed light beacons, eg:



**P5**

In all cases, the symbol and associated legends must be upright.

Radar reflectors should not normally be charted but the qualifications in B-465 ‘Radar reflectors on buoys’, are appropriate for buoyant beacons also.

## B-460 VISUAL AIDS: BUOYAGE

The following paragraphs apply to ~~to navigational and special purpose~~all buoys, except mooring buoys. For mooring buoys, see B-431.5-7 and B-445.4b. ~~Some of the remarks may not apply to spar buoys.~~

**Commentaire [c27] :** This ref is to the draft revised version of B-445.

The physical characteristics of buoys affect charting practice and are therefore briefly described below.

All associated legends should be in sloping text.

**B-460.1** **The mooring ground tackle** of a buoy usually consists of a sinker and chain, the length of the chain being generally about three times the depth of water, where tides are significant. Accordingly, there may be a difference between flood and ebb positions of a buoy, which may be plottable at chart scale. Also, buoys are liable to drag their moorings out of position at times. **The position to be charted** is the position assigned by the buoyage authority. This is generally the mean of flood and ebb positions, and the position to which the mooring will be returned if the buoy is found to have dragged it away.

**B-460.2** **The body** of a buoy is principally a float which may be given a distinctive shape (see B-462), or may be a support for a superstructure which can be given a distinctive shape by means of lattice-work 'wings' or 'cages'. Some buoys, eg a fairway entrance buoy, have a tall superstructure to carry a light, fog signal, radar reflector, and possibly topmark. In such cases, the superstructure may not have been given any special shape; ~~it is recommended that~~ such buoys should be charted as pillar buoys, see B-462.5.

**B-460.3** **Topmarks** are fitted to most buoys and are ~~invariably~~ distinctively shaped ~~and may be intended either~~ for identification; for details see B-463. ~~Radar reflectors may be almost as prominent on buoys as topmarks but are to be charted, if at all, solely by the special symbol~~

~~S4~~

~~not as a topmark. In the case of the IALA Maritime Buoyage System buoyage, it is recommended that radar reflector symbols should normally be omitted; see B-465.~~ Topmarks are liable to be damaged by ice, and so buoys in areas where the sea freezes may not be fitted with topmarks. For radar reflectors, which may be almost as prominent on buoys as topmarks, see B-465. Where a buoy's structure adequately covers the shape requirement, it may have no topmark, eg:

**B-460.4** **The size** of buoys varies with both the range of visibility required and the difficulties of the location (deep water and strong tidal streams need longer, heavier moorings and therefore larger floats). It is considered practicable to distinguish on charts between only two sizes of buoys (apart from major floating lights - see B-474, and spar buoys - see B-462.2):

**a.** 'Standard' buoys, including ~~those~~ tall buoys sometimes described as 'high focal plane'.

**b.** Superbuoys. Very large buoys, generally more than 5 m in diameter, which should be distinguished on charts because their unusually large size renders them a potential hazard even to large vessels and/or their function or attachments render them unusually costly, or are such that their destruction could result in a disaster. The three principal types of superbuoy are:

- Offshore tanker loading/discharge buoys, often known as Single Point Moorings (SPM). ~~(~~Very large floating offshore oil terminals, incorporating oil storage and regularly manned, should not be classified as superbuoys - they usually resemble fixed platforms rather than buoys: see B-445.2~~)~~.

- ~~Certain~~ Very large Oceanographic Data Acquisition System (ODAS) buoys, usually moored in deep water, for the automatic collection of oceanographic and meteorological information. See B-462.9. Note: not all ODAS buoys are of superbuoy size.

- Large Automatic Navigation Buoys (LANBY) designed to take the place of a light vessel where construction of an offshore light station is not feasible. A LANBY generally has a principal dimension of 8m or more in the water-plane, and the elevation of the light is generally at least 10m above the waterline, see B-474.

**B-460.5** **Seasonal buoyage.** In certain waters many buoys and major floating lights are withdrawn for the duration of adverse seasonal conditions eg ice conditions in winter and heavy seas associated with monsoons. Charts must show buoyage as found in summer or fair weather. Details of withdrawal in winter, heavy seas etc, should not normally be given on paper charts, although these details may be mentioned in a chart note. Their withdrawal and subsequent re-establishment is more usually the subject of a temporary Notice to Mariners.

Some buoys are laid seasonally in coastal waters, eg: ~~as~~ racing marks~~, or f~~ in summer, fish traps and tunny nets in fishing seasons. Such buoys ~~are of real interest for navigation they~~ may be charted with an appropriate legend, eg:


**Q71**

**B-460.6** **Names or numbers** of buoys are normally painted on them. Names are sometimes abbreviated. W~~ll charts, w~~here space permits, the names, letters or numbers should be shown in sloping text, in the form painted on the buoys themselves if known, eg *Banc Fairy Sud, No3, NR3.E, ODAS*. However, if necessary for clarity (eg to avoid the risk of a buoy number being mistaken for a sounding) numbers or letters may be surrounded by single quotation marks, or preceded by the abbreviation '*No*' (for number) or equivalent. Where there is a sequence of numbered buoys, all the designations in the sequence should be depicted in the same manner.

**B-460.7** **Retroreflectors.** Retroreflective material may be secured to unlit marks to aid their identification at night. The material is coloured according to one of two recognized IALA codes ('Standard' and 'Comprehensive'). In any specified area only one of the codes will be used and this may be given in Sailing Directions. To avoid clutter, retroflectors must not be depicted on paper charts. The Mariner will know what colour to expect from the charted buoy symbol (colour and shape).

## B-461 BUOYAGE SYSTEMS

Systems of buoyage are ~~basically~~ described as **lateral, cardinal,** or a combination of lateral and cardinal. Lateral systems depend on a **direction of buoyage** being defined, generally in accordance with the direction of the flood tide or an approach from seaward. The cardinal system depends solely on the main **points of the compass.**

Special-purpose buoys often mark the limits or centre of an area (eg an exercise area, a dumping ground) and do not necessarily have lateral or cardinal system characteristics.

**B-461.1** **The 1936 Agreement for a uniform system of maritime buoyage,** commonly referred to as the 'Geneva Convention', provided for both lateral and cardinal systems. Its origins were an agreement in 1889 when some countries standardized on red conical buoys to mark the starboard hand and black can buoys to mark the port hand. Unfortunately, when lights for buoys were first introduced, some European countries placed red lights on the black port hand buoys to conform with the red lights to mark the port side of harbour entrances, whilst in North America red lights were placed on the red starboard buoys. The 1936 Agreement stated that lights should be red to port and white to starboard, but the USA and others were not signatories, and preferred their own system of using red lights and red daymarks to mark the starboard side of a channel.

The Geneva Convention was not ratified. However, ~~prevented by World War II but the~~ aids to navigation ~~re~~-established from 1946 onwards in Europe were broadly based on the Convention, though fairly wide differences in interpretation ~~which have~~ caused difficulties.

**B-461.2** **The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA)** set up a committee in 1965 to harmonize the existing rules. By 1976 the rules for System 'A' (red to port) were completed and implementation began in 1977. The rules for System 'B' (red to starboard) were completed early in 1980 but were so similar to those for 'A' that the two were combined to become **'The IALA Maritime Buoyage System'**. Within the single system, lighthouse authorities are allowed the choice of using red to port or red to starboard on a regional basis, the two regions being known as Region A and B, respectively. To achieve this single set of rules some minor additions to System A rules were implemented and adopted in November 1980.

IALA definitions are taken from the 'International Dictionary of Aids to Marine Navigation' published by IALA in several languages.

**B-461.3** **The IALA Maritime Buoyage System** details, including the extent of Regions A and B, are given in other publications (eg UK's booklet NP 735 'IALA Maritime Buoyage System'). The following specifications apply to both Regions. Although it is called a buoyage system, it applies to all fixed and floating marks except lighthouses, some sector lights, leading lights and marks, major floating lights and lights on offshore structures. Five types of marks are provided by the system: Lateral, Cardinal, Isolated danger, Safe water and Special marks, which may be used in any combination. Emergency Wreck Marking Buoys were added on a trial basis in 2006.

The following are brief details of the purpose, shape, colour, topmarks and lights used within the IALA System. More details, including charting practice, are given in the specifications which follow. A summary table is provided at B-467.

**Commentaire [c28] :** Suggest that AU's additional information on IALA system marks is better placed in this section, amplifying the following specific information about types of marks, rather than at the end of the section specific to shapes of buoys. The additions provide more detail than in the AU original and derive from NP735.

**a. Lateral marks** are generally used for well defined channels, in conjunction with a direction of buoyage (see B-461.4). They indicate the port and starboard sides of the route to be followed. **Port hand** buoys are usually can, but may be another shape (except conical or spherical). Beacons and other shaped buoys have a can topmark. The colour of buoys, beacon, topmarks and lights (if fitted) will be red in IALA region A and green in IALA region B. **Starboard hand** buoys are usually conical, but may be another shape (except can or spherical). Beacons and other shaped buoys have a conical topmark. The colour of buoys, beacons, topmarks and lights (if fitted) will be green in IALA region A and red in IALA region B. A **preferred channel mark** is a modified lateral mark, with horizontal colour bands. The shape and predominant colour indicates which side is the preferred channel, the other colour indicates the secondary channel. If fitted, the light is Fl (2+1), the colour indicating the preferred channel.

**b. Cardinal marks** are used in conjunction with the compass to indicate where a mariner may find best navigable water, taking their name from the quadrant in which they are placed in relation to the point marked. The mariner should pass N of a North mark, E of an East mark, etc.
The shape of cardinal buoys is not significant (although they are usually pillar or spar). The body has black and yellow bands, configured with black reflecting the points of the topmark cones (eg black above yellow for north), see B-464.3. Black double-cone topmarks are an important feature of cardinal marks and are carried wherever practicable. The points are up for a north mark, down for a south mark, apart for an east mark and together for a west mark. Lights (if fitted) are white Q or VQ, uninterrupted for the north, 3 flashes for east, 6 flashes + LFl for south and 9 flashes for west (resembling an analogue clock).

**c. Isolated danger marks** are erected on, or moored above, isolated dangers of limited extent with navigable water all around them. As the danger must be charted in its correct position, the symbol for an isolated danger buoy will inevitably be slightly displaced on paper charts. The shape of isolated danger buoys is not significant (although they are usually pillar or spar). The body is black, with one or more red bands. Black double-sphere topmarks are an important feature of isolated danger marks and carried wherever practicable. The light (if fitted) is white Fl(2).

**d. Safe water marks** are used to indicate there is safe water all around the mark. It may be used as a centre-line, mid-channel or landfall buoy, or to mark the best point of passage under a bridge. The shape of a safe water buoy is spherical, pillar or spar. The body of the mark has red and white vertical stripes. A red spherical topmark is an important feature if the buoy is not spherical and carried wherever practicable. The light (if fitted) is white Oc, Iso, LFl or Mo(A) with a period of 10s.

**e. Special marks** are used to indicate to the mariner a special area or feature, the nature of which is usually apparent from the chart or associated publication. They are also used to mark channels within channels, eg yellow buoys marking a deep channel within a channel for normal navigation marked by lateral buoys. In such cases, the special marks will conform with lateral shapes. A special buoy may be any shape but must not conflict with lateral or safe water marks (eg an outfall buoy on the port-side of a channel could be can but not conical). The body of the mark is yellow. The topmark (if fitted) is a yellow X. Lights (if fitted) are yellow and of any rhythm except those used for cardinal, isolated danger and safe water marks. Special marks may be used to mark a channel within a channel (eg a DW route), using yellow buoys of the appropriate lateral shape, or yellow spherical buoys to mark the centreline.

**f. Emergency Wreck Marking Buoys (EWMB)** (on trial from 2006) are used to mark new dangers until a permanent form of marking has been established and the danger itself has been promulgated by Notice to Mariners, or removed. An EWMB is either a pillar or spar buoy, with blue and yellow vertical stripes. The topmark (if fitted) is an upright yellow cross. Lights (if fitted) are Al.Oc.BuY.3s.

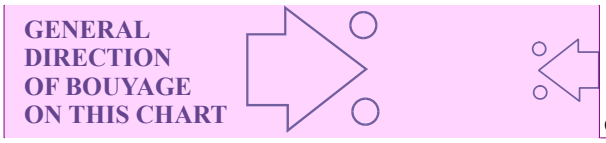
**B-461.4** **IALA System: Direction of buoyage.** The conventional direction of buoyage for lateral marks is defined by IALA as being governed by two principles:

> 'A direction specified for an area of sea or inland water in order to define the port and starboard sides of navigable water in the area. It may be indicated on charts or in other appropriate nautical documents. It is either:
>
> - the general direction taken by a vessel on approaching a harbour, river, estuary or other waterway from seaward, or
> - the direction determined by the appropriate authority, but it should be based wherever possible on the principle of following a clockwise direction around continents'.

Each hydrographic office should therefore consider issuing a suitable diagram (in Sailing Directions or elsewhere) to illustrate the second principle in its area of interest.

If marks at the side of the channel are numbered or lettered, the numbering or lettering follows the direction of buoyage.

**B-461.5** **Charting the direction of buoyage.** If it is required to chart the direction of buoyage, the symbol below should be used:




**Q130.2**

**Commentaire [c29] :** DID: please correct spelling of BUOYAGE.

The symbol may be accompanied by an explanatory legend (in magenta), particularly if both general and local direction arrows are included on the same chart. The size of the arrows is at the discretion of the cartographer; however, usually a single 'general direction' arrow should be significantly larger than 'local direction' arrows. On 'multicoloured' charts (see B-140), the circles

may be coloured red and green as appropriate.

Where two opposing local directions meet, two arrows (size at cartographer's discretion) should be inserted, point to point but with a gap of at least 5mm between them. Additionally, a dashed magenta line (N1.2) may be inserted perpendicular to the arrows' direction, across the channel, with a magenta explanatory legend, eg: '*Change of buoyage direction*'.

**Commentaire [c30] :** DID: please insert example based on the specification above.

When considering the requirement for buoyage direction arrows, ~~On charts are concerned,~~ the following assumptions are made ~~herein~~:

1. In harbour approaches and estuaries, a knowledge of the first general principle quoted above, together with the channel buoy symbols, give competent navigators a clear indication of the conventional direction of buoyage without the need for a special arrow or other means of indication.

2. Isolated offshore buoys will generally be cardinal buoys (which do not depend on a conventional direction of buoyage).

3. Difficulties for navigators may arise:
   - if a lateral system is used in a one-way traffic lane where the direction of buoyage is opposed to the traffic direction;
   - where 'straight through' buoyage of a strait overrides the 'approach from seaward' convention; ~~or~~
   - where two opposing directions meet;
   - where the lateral system extends a long way offshore and, at its outer part, has a local direction opposed to the general direction (eg, as occurs in the northern part of the outer River Thames estuary in UK);
   - knowing which side to pass when confronted with a 'new danger' (described by IALA as one which has been marked by buoys but not yet charted).

   For such potentially confusing situations, it is advisable to include an arrow symbol **(Q130.2)** to indicate the direction of lateral buoyage.

## B-462 SHAPES OF BUOYS

The principal shapes are those recommended in the IALA Maritime Buoyage System, namely: conical, can (cylindrical), spherical, pillar and spar. As far as possible, variants of these basic shapes must be classified under these headings, for symbolization on charts. In practice, there will remain some additional shapes, eg minor light floats and barrel buoys, which will require their own symbols. Special marks may have any shape but must not conflict with those used for lateral or safe water marks, eg an outfall buoy on the port hand side of a channel could be can-shaped, but not conical.

Many buoys carry topmarks (see B-463) and lights (see B-466).

~~Nations adopting the new buoyage rules are recommended to adopt the standard symbols shown below.~~

~~The reference 'IALA Dictionary', refers to the 'International Dictionary of Aids to Marine Navigation' published by IALA in several languages.~~

**B-462.1** **Features common to all buoys.** The position of the buoy must be indicated by a small circle (without central dot) in the middle of the base of the buoy symbol.

**Q1**

The buoy symbol must be a stylized pictorial representation of the actual shape seen in profile from sea level.

Buoy symbols, excluding major floating lights, light floats and superbuoys, should normally be shown sloping to the right. To avoid other detail, the slope may be varied in particular instances, but the base of the buoy symbol must always be horizontal.

**B-462.2** **Conical.** ~~France: Bouée conique. Germany: Spitztonne.~~

**Q20**

IALA definition:

> 'A buoy of which the part of the body above the waterline, or the greater part of the superstructure, has approximately the shape or the appearance of a pointed cone with the point upwards'.

The '**ogival**' shape (a shape in profile like that of a pointed arch) and the American '**nun**' buoy must also be represented by the conical symbol.

In the IALA System, a conical buoy indicates that the buoy should be left to starboard when following the direction of buoyage. Cartographers should chart the 'real-world' situation; however, if a conical buoy appears to be misleadingly placed, they should obtain confirmation from the source authority. ~~The '**ogival**' shape (a shape in profile like that of a pointed arch) and the American '**nun**' buoy must also be represented by the conical symbol. The American '**nun**' buoy is a variation of the conical shape and should be represented by the conical symbol.~~

**Commentaire [c31] :** Suggested wording to cover FR's suggestion, without making it impossible to show the real-world situation if a buoy does not conform to IALA. Also B-462.3 & .4.

The conical symbol must not be used for the type of tall framework structure used **solely** as a support for a light and other aids to navigation: for this type of buoy, see **Pillar** B-462.5.

**B-462.3** **Can (cylindrical).** ~~France: Bouée cylindrique. Germany: Stumpftonne.~~



**Q21**

IALA definition:

> 'A buoy of which the part of the body above the waterline, or the greater part of the superstructure, has the shape or the appearance of a cylinder, or of a truncated cone that approximates to a cylinder, with a flat end uppermost'.

In the IALA System, a can buoy indicates that the buoy should be left to port when following the direction of buoyage. Cartographers should chart the 'real-world' situation; however, if a can buoy appears to be misleadingly placed, they should obtain confirmation from the source authority. Tall cylindrical spar buoys must not be charted as can buoys; see B-424.6.

**B-462.4** **Spherical.** ~~France: Bouée sphérique. Germany: Kugeltonne.~~



**Q22**

IALA definition:

> 'A buoy of which the part of the body above the waterline, or the greater part of the superstructure, has the shape or the appearance of a part of a sphere'.

In the IALA System, a spherical buoy indicates that there is navigable water all around its position. Cartographers should chart the 'real-world' situation; however, if a spherical buoy appears to be

misleadingly placed, they should obtain confirmation from the source authority.

**B-462.5** **Pillar.** ~~France: Bouée charpente; bouée pylône. Germany: Bakentonne.~~

**Q23**

IALA definition:

> 'A buoy of which the part of the body above the waterline is a pillar, or of which the greater part of the superstructure is a pillar or a lattice tower'.

Buoys (other than spars) which are relatively tall in relation to their diameter, but otherwise have no distinctive shape, must be charted by the symbol shown. This symbol should be used for both 'high focal plane' and similar, smaller pillar buoys. ~~In the cardinal system, most such buoys will be fitted with topmarks and many with lights.~~

In the IALA System, the shape of a pillar buoy has no navigational significance.

**B-462.6** **Spar.** ~~France: Bouée espar. Germany: Spierentonne. Sweden: Priek.~~

**Q24**

IALA definition:

> 'A buoy in the form of a pole, or a very long cylinder, floating upright'.

~~Many such buoys carry topmarks; a few carry lights; the representation of these is shown in B-466.~~

The term 'floating beacon' should not be used. See B-459 for Buoyant Beacons.

Spindle buoys ~~(France: Fuseau. Germany: Spindeltonne)~~ are ~~fairly~~ similar in shape to spar buoys, but pointed, and should be charted by the same symbol.

In the IALA System, the shape of a spar or spindle buoy has no navigational significance.

**B-462.7** **Barrel.** ~~France: Bouée tonne. Germany: Fasstonne.~~



**Q25**

IALA definition:

> 'A buoy in the form of a barrel or cylinder floating horizontally'.

A barrel buoy may be used in the IALA ~~Maritime Buoyage~~ System, but only as a special mark. For mooring buoy symbols, see B-431.5.

**B-462.8** **Light float**. A boat-shaped structure used instead of a light buoy in waters where strong streams or currents are experienced, or when a greater elevation than that of a light buoy is necessary, eg:


**Q30** ~~(part of IALA System)~~


~~**Q31** (not part of IALA System)~~

Formerly, unmanned light vessels were called 'major light floats'. These are now charted as major floating lights, see B-474 ~~for larger light floats serving as major floating lights~~.

**Commentaire [c32] :** INT1 editors, please note to add another example (eg red with can topmark) to Q30 and remove ref to IALA and Q31

**Commentaire [c33] :** DID, please add example of red (open) light float, with can topmark.

**B-462.9 Superbuoy.**

~~The basic symbol~~  **Q26**

Very large buoys (generally larger than 5m in diameter) are referred to as 'superbuoys', see B-460.4b. ~~for major floating lights (see B-474).~~

The purpose of an Ocean Data Acquisition System (ODAS) buoy should be indicated by a legend.:



**Q58**

Note: not all ODAS buoys are of superbuoy size; the appropriate buoy symbol should be used.

For a superbuoy ~~is~~ used as a tanker loading mooring, see B-445.4b.

For major floating lights (see B-474).

**B-463 TOPMARKS ON BUOYS (AND BEACONS)**

Many different topmarks are used on buoys (and on beacons) but in the IALA Maritime Buoyage System the variations are reduced to a few important shapes: can, conical, spherical, and X-shaped. The trial emergency wreck marking buoy has a new upright cross (cruciform) shape. The term 'daymark' may be used instead of 'topmark' in the US.

A topmark must be in the same orientation as the symbol to which it is attached, eg, a buoy topmark must slope at the same angle as the rest of the buoy and a beacon topmark must normally be upright (for exception, see B-455.6).

**B-463.1 IALA Maritime Buoyage System - Topmarks**

**a. Lateral marks** may have a single can (cylindrical) topmark on the port hand and a single conical topmark (point up) on the starboard hand, coloured red or green as appropriate for Region A and Region B. Can and conical buoys indicate by their shape which is the correct side to pass, so these buoys may not be fitted with topmarks. If the buoy does not have a distinctive shape, a topmark will usually be fitted.

 **Q9**

The order of the topmarks above is Region A: red to port, green to starboard, Region B: green to port, red to starboard.

**b. Cardinal marks** have two black cone topmarks, one above the other. ~~Examples of recommended symbols are shown.~~ There must be a clear separation between each cone; in particular, two cones base to base must not be shown as a diamond shape. ~~The topmarks are all painted black.~~ ~~See also B-464.1.~~

 **Q9**

The order of the topmarks above is North, South, East, West. It helps to remember that the point of the cone reflects the position of the black band(s) on the body of the buoy (or beacon), eg for a West cardinal mark, the black band is in the middle.

**c. Isolated danger marks,** which indicate the location of an isolated danger of limited size that is completely surrounded by navigable water ~~all around~~, have two black sphere topmarks, one above the other., ~~painted black~~.

Q9

**d.** **Safe water marks,** as used for centre-lines of channels or as landfall marks, may have a single red sphere ~~as a~~ topmark. Spherical buoys indicate by their shape that there is navigable water all around them, so such buoys may not be fitted with topmarks.

Q9

~~**d. Lateral marks** may have a single can (cylindrical) topmark on the port hand and a single conical topmark (point up) on the starboard hand, coloured red or green as appropriately for Region A and Region B. Can and conical buoys indicate by their shape which is the correct side to pass. If the buoy does not have a distinctive shape, a topmark will usually be fitted.~~

~~Q9~~

~~The order of the topmarks above is Region A: port, starboard, Region B: port, starboard.~~

**e.** **Special marks,** not primarily intended to assist navigation but indicating a special area or feature, may have a single yellow diagonal 'X' shaped topmark (St Andrew's cross).

Q9

Special marks may also be used to mark Traffic Separation Schemes, or channels within channels (eg a Deep Water route within a wider navigation channel marked by standard lateral buoys) or special purpose channels (eg for small craft).

**f.** **Emergency wreck marking buoys,** intended for the temporary marking of a new wreck (on trial from 2006), may have a yellow standing/upright '+' shaped topmark (St George's cross).

Q9

**B-463.2** **Leading topmarks** are often added to leading beacons (B-458), which are usually constructed in pairs and provide a lead to be followed (see B-433). There is currently no guidance on the standard shapes or colours of topmarks for leading marks. However, leading topmarks are commonly triangular shaped structures pointing upwards (front) and downwards (rear), but other shapes may be used.

**B-464** **COLOUR OF BUOYS (AND BEACONS)**

These paragraphs refer only to the colour of buoy (or beacon) bodies, ~~and topmarks,and any retroreflective material applied to them, but~~ not to the colour of any lights exhibited. Retroreflective material must not be charted, see B-460.7.

Where buoys (or beacons) are painted in more than one colour, '**stripes**' are vertical (or exceptionally on non-IALA buoys, diagonal) and '**bands**' are horizontal.

Within the IALA Maritime Buoyage System:

- red and green are used for lateral marks,
- black and yellow bands are used for cardinal marks,
- black and red bands are used for isolated danger marks,
- red and white stripes are used for safe-water buoys,
- yellow is used for special marks,
- blue and yellow stripes are used for emergency wreck marking buoys (on trial from 2006).

Red and green on lateral marks have different meanings in IALA Regions A and B, therefore the applicable region must be stated on charts – see B-241.8.

**B-464.1** **Colour representation** is ~~very~~ effective in the case of filled and open (ie ~~unshaded~~unfilled outline)

**Commentaire [c34] :** To duplicate S57 term.

**Commentaire [c35] :** To duplicate S57 term.

**Commentaire [c36] :** DID, please create a new topmark, consisting of a cross, sloping 15° to the right.

**Commentaire [c37] :** There is a cross reference to B-458 in this section. This section is on topmarks, there seems no need for a sentence about daymarks, which are covered at B-455.9. Topmarks are daymarks, but daymarks are not necessarily topmarks.

**Commentaire [c38] :** Black omitted following query raised with IALA re Q130 (note), whether black is permitted for lateral marks. Impacts INT1.

**Commentaire [c39] :** May be redundant if new detail at B461.3 is accepted

symbols. The old scheme of lines, dots and chequers to represent colour(s) is obsolete and should no longer be used, as it cannot satisfactorily be used for topmarks and some types of buoy symbols (eg spar buoys and most multicoloured buoys). On multicoloured charts, buoys may be shown in their actual colour, or follow the rules for 'standard' coloured charts, which are:

~~**For the IALA System, and possibly other systems, it is recommended that:**~~

**a**. **A black or green buoy** must be represented by a ~~black (ie~~ filled ~~in)~~ symbol ~~must be used to represent a black buoy and, where green and black buoys have exactly the same significance to a navigator, it must also represent a green buoy~~,eg:

**Q2**

Note: a spar buoy is always charted filled, irrespective of its actual colour, eg:

**Q5**

**b**. **Any other colour of buoy, or multicoloured buoy** (except spar buoys, see (a) above, and some preferred channel buoys, see (e) below) must be represented by an open symbol (ie unfilled outline) ~~must be used to represent any other colour of buoy, or multi-coloured buoy (except spar buoys and some preferred channel buoys).~~, eg:

**Q3**

**c. A striped buoy** (except spar buoys, see (a) above) must be represented by an open buoy symbol with a single line from top to bottom ,,eg:

**Q5**

**d**. **A banded buoy** (except spar buoys, see (a) above, and predominantly green preferred channel buoys, see (e) below) must be represented by an open buoy symbol. No change is made to the buoy symbol to represent bands. This can be deduced from the multiple letter abbreviations, the topmark and lack of vertical line, eg:

**Q4**

**e**. **Preferred channel (or bifurcation) buoys** are modified lateral marks within the IALA Maritime Buoyage System (ie green with red band, or red with green band). The symbol used should follow the lateral convention, ie a filled symbol must represent a predominantly ~~black or~~ green mark, and an open symbol must represent a predominantly red mark, eg:

**Q130.1**

**Commentaire [c40] :** DID, please add open can buoy with letters RGR, a open conical buoy with letters RGR and a filled in can buoy with letters GRG underneath. (There are examples in Q130.1)

**B-464.2** **International abbreviations for colours** are specified in B-450.2. Where there is insufficient space on charts for abbreviations, the topmarks alone (for cardinal buoys and beacons) or the filled and open symbols (for lateral buoys) may be considered adequate to indicate colours, without abbreviations.

**B-464.3** **Abbreviations for multiple colours** on buoys (and beacons) must be shown in accordance with the following conventions:

**a**. Where the colours are in bands the sequence of colour abbreviations must be from top to

bottom, eg in the IALA System:

- a north cardinal mark (black above yellow): *BY*
- an east cardinal mark (black with single broad horizontal yellow band): *BYB*
- a south cardinal mark (yellow above black): *YB*
- a west cardinal mark (yellow with a single broad horizontal black band): *YBY*
- a preferred channel lateral mark: *GRG* or *RGR*.
- an isolated danger mark (black with one or more broad horizontal red bands): *BRB*


**Q4**

Note: It helps to remember that the points of the topmark cones (for cardinal marks) reflect the position of the black band(s) on the body of the buoy (or beacon), eg for a north cardinal mark, the black band is at the top.

**Commentaire [c41] :** This provides more detail than B-461.3, so should probably be retained

**b**. Where the colours are in stripes (vertical or diagonal) or the sequence of horizontal bands is not known, the darker colour must be given first, eg in the IALA System:

- a safe water buoy (red and white vertical stripes): *RW*


**Q5**

- an emergency wreck marking buoy (blue and yellow vertical stripes): *BuY*

~~As an aide-memoire, it may be noted that the black topmarks on a cardinal buoy are a 'pointer' to the position of the black bands on the body of the buoy, ie, N topmarks point up, and black is above yellow; E topmarks point up and down, and black is above and below yellow; and so on.~~

## B-465 RADAR REFLECTORS ON BUOYS

Note: this section also applies to buoyant beacons, but not to other beacons; see B-455.8.

**B-465.1** **Areas where radar reflectors are fitted to most buoys.** In many areas of the world, radar reflectors are ~~commonly~~ fitted to nearly all major buoys and to many minor ones. In such areas, the symbol~~, or abbreviation,~~ for a radar reflector should not be shown on buoy symbols in order to reduce the complexity of buoy symbols and associated legends.

In these areas, nations wishing to show the radar reflector symbol on **unlit** buoys may, exceptionally, do so but should include a chart note explaining why they are not shown on light buoys.

**B-465.2** **In other areas** where radar reflectors are not widely fitted to buoys, the existence of a radar reflector should be indicated by the symbol **S4** (in black), eg:


**Q11**

## B-466 LIGHT~~ED~~ BUOYS

Some nations give full details of their light buoys in their Lists of Lights and Fog Signals (LL); others do not. The largest scale charts should show the rhythm, colour (unless white) and period ~~full characteristics~~ of lights on buoys, if scale permits, ~~including rhythm, colour (unless white) and period,~~ irrespective of LL practice.

**B-466.1** **The symbol for a light~~ed~~ buoy** must be the same as that for an unlit buoy but with the addition of

the light description and light "patch" (or "flare symbol. The star, which duplicates the latter, should no longer be shown so as not to confuse the important information conveyed by the topmarks.

**a. Light descriptions** on floating marks, including the order of the various elements, should be the same as those used for fixed marks (see B-471). Height and range should not generally be charted for buoys, except superbuoys (see B-466.4). The text should be sloping.

**b. The flare** should be in magenta, or in the appropriate colour on multicoloured charts. It should be positioned about 1 millimetre from the point indicating the exact position of the buoy, orientated to avoid other charted detail, eg:


**Q7 and 8**


**Q41**

**Commentaire [c42] :** DID: these graphics are badly cropped, please replace.

**B-466.2** **Rhythm of lights on light buoys.** The special features of the IALA Maritime Buoyage System require some extension of the following range of abbreviations (and definitions). (Note: these also apply to light beacons which are part of the IALA System).

**a. Lateral** marks may exhibit red or green lights of any rhythm (but not fixed), including Long Flashing lights. A composite group flashing red or green light (eg Fl(2+1)R) is exhibited only from modified lateral (preferred channel) buoys, see B-464.1e.

**Commentaire [c43] :** Section reordered for consistency with other sections, ie lateral first, etc

**Commentaire [c44] :** DID: please insert graphic Q130.1. (both panels) with the coloured graphic bars from NP735 (p6) in columns underneath the appropriate regions.

**Q130.1**

**b. Cardinal marks:**

Where two similar cardinal buoys are laid fairly close to each other, a Buoyage Authority may distinguish them from each other by different flashing rates.

**North Cardinal** mark. A white light that is either uninterrupted 'very quick flashing' (either 120 or 100 flashes per minute) or 'quick flashing' (either 60 or 50 flashes per minute), without interruption. Where two North (or other cardinal) buoys are laid fairly close to each other, certain Buoyage Authorities wish them to be distinguishable from each other by the different flashing rates. The **international abbreviations** are: VQ (for Very Quick Flashing) and Q (for Quick Flashing):


**Q130.3**

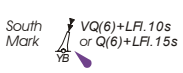
**Commentaire [c45] :** DID please replace the graphic bars with ones similar to 5011 for all the cardinal marks (ie triangles for quick flashes and thinner triangles for very quick). Retain the period time bars on the E, S and W marks.

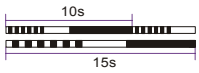
**East Cardinal** mark. The VQ or Q white light is interrupted after 3 flashes, the total period of a sequence of flashes followed by an eclipse being 5 or 10 seconds respectively for the VQ and Q lights. The **international abbreviations** are VQ(3) and Q(3), with periods also being added on the largest scale charts, where space permits:



**Q130.3**

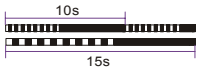
**South Cardinal** mark. The first phase of the white light is 6 VQ or Q for 6 flashes, followed immediately by a 'long flash' of two seconds or more, and then an eclipse; the total period of a sequence of flashes followed by an eclipse being either 10 or 15 seconds respectively. (VQ) or 15 seconds (Q). The **international abbreviations** are VQ(6)+LFl and Q(6)+LFl, with periods being added on the largest scale charts, where space permits.




**Q130.3**

**West Cardinal** mark. The VQ or Q white light is ~~either VQ or Q,~~ interrupted after 9 flashes, the total period of a sequence of flashes followed by an eclipse being ~~either~~ 10 ~~seconds (VQ)~~ or 15 seconds respectively. The **international abbreviations** are VQ(9) and Q(9), with periods being added on the largest scale charts, where space permits:

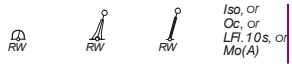

**Q130.3**

The unique character of these lights is such that periods could be omitted to avoid excessive length.

As an aide-memoire, the numbers of flashes: 3, 6 and 9, were chosen by IALA to correspond to the positions of figures on a clock face.

**c. Isolated Danger** mark**.** A white light that exhibits a group of two flashes (Fl(2)).

**d. Safe Water** mark. A white light that may be Isophase (Iso), or ~~Single~~ Occulting (Oc), or a single Long Flash~~ing~~ with a period of 10 seconds (LFl.10s), or Morse (A) (Mo(A)).
~~It is proposed to use, in the last case, the abbreviation: LFl with the period.~~




**Q130.5**

**e. Special marks.** A yellow light is exhibited, which may have any rhythm except those used for white lights on Cardinal, Isolated Danger or Safe Water marks. An ODAS buoy has a group of five flashes in a period of 20s (*Fl(5)Y.20s*).

**f. Emergency Wreck Marking buoy.** (On trial from 2006). The proposed light is an Alternating Occulting blue and yellow light, with 1 second periods of light separated by 0.5 second eclipses (*Al.Oc.BuY.3s*) .

**B-466.3** **The colour of a light on a light buoy** must be shown by the **international abbreviations**~~abbreviations~~ listed in B-450.2, except that the omission of a colour abbreviation from the chart ~~shall~~ means that a light is white. ~~See also B-450.3 for capitalization of the letters of the abbreviation.~~ The abbreviation for colour (if any) must follow the abbreviation for the rhythm.

**B-466.4** **The period of a light on a light buoy** is the time taken to exhibit one full sequence of phases. It must be expressed in seconds, using the **international abbreviation** 's', eg 15s (with no space between figure and letter). Periods of less than 3 seconds may be given to the nearest 0.1 of a second, eg *2,4s*.

The period should normally be the final part of the light-description for buoys, except in the case of 'superbuoys' (see B-460.4b and B-462.9) where height and/or range may be added. For periods of light buoys in the IALA System see B-466.2 and B-471.5. In general, the period is the least important part of a light description and must be omitted first if there is no space to give full details, or if the chart is on a relatively small scale. However, the positive identification of a single aid to navigation is often vital to mariners. If, for example, adjacent buoys have Iso 4s and Iso 8s lights respectively, they should not both be abbreviated simply to 'Iso', but should also include the period of the light.

**Commentaire [c46] :** DID: please add graphic Q130.4 and time bar from NP735

**Commentaire [c47] :** DID: please add flares to buoys

**Commentaire [c48] :** DID: please add graphic bars (could be taken from NP735), but add a period time bar to the LFl 10s bar.

**Commentaire [c49] :** UK's Lights Officer advises that the *(2)* is inappropriate.

**Commentaire [c50] :** To be consistent with B-471.5

## B-467 Summary table of IALA marks:

| Mark | INT1 ref | Shape (if a buoy)* | Colour | Topmark (if fitted) | Light (if fitted) |
|---|---|---|---|---|---|
| **Lateral marks - Region A** | | | | | |
| Port | Q130.1 | Can (pillar, spar) | R | □ R Can | R: any rhythm except Fl(2+1) |
| Starboard | Q130.1 | Conical (pillar, spar) | G | ▲ G Cone | G: any rhythm except Fl(2+1) |
| Preferred Channel to starboard | Q130.1 | Can (pillar, spar) | RGR (bands) | □ R Can | Fl(2+1)R |
| Preferred Channel to port | Q130.1 | Conical (pillar, spar) | GRG (bands) | ▲ G Cone | Fl(2+1)G |
| **Lateral marks - Region B** | | | | | |
| Port | Q130.1 | Can (pillar, spar) | G | ■ G Can | G: any rhythm except Fl(2+1) |
| Starboard | Q130.1 | Conical (pillar, spar) | R | Δ R Cone | R: any rhythm except Fl(2+1) |
| Preferred Channel to starboard | Q130.1 | Can (pillar, spar) | GRG (bands) | ■ G Can | Fl(2+1)G |
| Preferred Channel to port | Q130.1 | Conical (pillar, spar) | RGR (bands) | Δ R Cone | Fl(2+1)R |
| **Other marks – Regions A & B** | | | | | |
| North Cardinal | Q130.3 | Pillar or spar | BY (bands) | ▲ Black ▲ cones | Q VQ |
| East Cardinal | Q130.3 | Pillar or spar | BYB (bands) | ▲ Black ▼ cones | Q(3) VQ(3) |
| South Cardinal | Q130.3 | Pillar or spar | YB (bands) | ▼ Black ▼ cones | Q(6)+LFl VQ(6)+LFl |
| West Cardinal | Q130.3 | Pillar or spar | YBY (bands) | ▼ Black ▲ cones | Q(9) VQ(9) |
| Isolated danger | Q130.4 | Pillar or spar | BRB (bands) | ● 2 Black ● spheres | Fl(2) |
| Safe water | Q130.5 | Spherical, (pillar, spar) | RW (stripes) | ○ Red Sphere | Iso, Oc, LFl.10s Or Mo(A) |
| Special | Q130.6 | Any, but must not conflict with lateral shape | Y | **X** Yellow diagonal cross | Y light of any rhythm except those used for cardinal, isolated danger and safe water marks (ODAS buoy Fl(5)Y.20s) |
| Emergency Wreck Marking Buoy | | Pillar or spar | BuY (stripes) | **+** Yellow upright cross | Al.Oc.BuY.3s |

*** The usual buoy shape is listed, with other possibilities in brackets. In certain circumstances, eg fast currents, a boat shaped float may be used.**

**B-470 LIGHTS: GENERAL ~~POINTS~~**

These specifications include lights of all types other than those on buoys and minor light floats. Major floating lights (light vessels, major light floats and Large Automatic Navigation Buoys (LANBY) have functions similar to those of major lights on land; ~~points relating particularly to them are given in~~see B-474.

**B-470.1 Charts and other publications.** Positions of lights, and bearings of leading and sectored lights, are best shown graphically, but full details of a major light and its structure cannot easily be charted. There is inevitably duplication of some information on charts and in ~~the~~ Lists of Lights and Fog Signals (LL) and Sailing Directions.

Full (or abridged – see B-472) descriptions of lights should be shown on charts, but ~~very~~ limited information about light structures (such as lighthouses) can be shown. Details of the structure and additional details about the light (eg intensity, phases) should be given in LL, so the name of a light or its location should be shown to facilitate reference between the chart and the LL. ~~together with an effective means of finding a charted light in the other publications. Normally a light is found first by looking up its name or the name of the locality and then, if necessary, by latitude and longitude.~~

**B-470.2 Definitions of the technical terms** used in these specifications are given in IHO publication M-12 'Standardization of List of Lights and Fog Signals'~~, and are repeated or expanded here only where special distinctions are needed in chart symbols and abbreviations~~.

Charts and LL should ~~obviously~~ agree in definitions, names and abbreviations used, as well as in the characteristics of the aids to navigation. However, short term differences may have to be tolerated, due to different maintenance mechanisms. ~~when major changes, such as in the definition of the range at which a light is visible, are in progress.~~

**B-470.3 The IALA Maritime Buoyage System** rules will apply to minor lights but not to leading lights, some sector~~ed~~ lights, landfall lights or major floating lights. Increasingly sector lights follow IALA convention when used for marking a channel. General information on the IALA System is ~~primarily concerned with buoyage, so general information is~~ given in B-461.

**B-470.4 Colours of lights~~: use of colour plates~~**

**a. General rules on 'multicoloured' charts:**

The use of colours additional to the minimum four colours (see B-140) is particularly useful for depicting light sectors marking intricate inshore channels. For further guidance on placing sectors, see B-475. The following specifications should be adhered to on multi-coloured charts, to achieve conformity:

- Colours for flares and sector arcs should be chosen to be easily distinguishable from any background tint. They should also be tested for visibility under vessels' bridge lighting.
- Light flares must be in the appropriate colour:
  - Yellow/orange should be used for white, yellow, amber and orange lights.
  - Red should be used for red lights. Alternatively, magenta may be used.
  - Green should be used for green lights.
  - Blue/cyan should be used for blue lights.
  - Magenta may be used for violet lights.
- Sector limits should be fine dashed lines, but may be shown as fine continuous lines. Emphasis may be provided by 1mm wide colour bands where marking the sides of a fairway (see B475.1, 475.5 and INT1 P41.2).
- Sector arcs should be fine dashed lines, but may be shown solely by coloured arcs. The **international abbreviation** for the colour or character of the light (see B475.1 and INT1 P40.2) should be added, in case the colour is difficult to distinguish under vessels' bridge lights.
- Coloured sector arcs should be situated to avoid conflict with significant detail. If colour arcs

(including circles for all-round, ie 360° lights) are placed within 30mm of the light star, the flare(s) may be omitted. Where this cannot be achieved, coloured arcs should be broken to clear significant detail, or the arc moved further from the light, but not beyond the range of the light. In the latter case, coloured flares should be located at the light star.

- Coloured sector arcs (or circles for all-round lights) should be 1mm wide. Faint sectors may be 0.5mm wide. In very narrow sectors, a wider wedge of colour should be shown, so that it is clearly visible.
- Coloured sector arcs (or circles for all-round lights) should be used on all major lights~~, including un-sectored lights~~. Leading lights (with narrow sectors) and minor lateral lights should usually be shown by flares.
- Alternating and oscillating lights should be shown by parallel or overlapping different coloured arcs (or circles for all-round lights).
- The floodlit (illuminated) symbol (**P63**) should be yellow/orange.
- The Moiré effect symbol (**P31**) and strip light symbol (**P64**) should be coloured as appropriate to the light.
- For omission of colours in the light description, see B-472.3

**b**. **On 'four-colour' charts.**

Complex sector lights must be charted in black, with magenta light flares. Sectors marking shipping channels may be emphasised by using continuous lines (see B-475.5). ~~(as on many Swedish charts).~~

This economical representation does not prevent navigators from hand colouring sectors of interest to them and, indeed, may be quite adequate for the masters of piloted ships. This portrayal has some advantages relative to multicoloured portrayal: it is easier for the user to correct charts, and is not subject to changing appearance under certain types of vessels' bridge lighting.~~, and printing is easier and cheaper. In charting the tidal estuaries of the German and Netherlands coasts, where complex light sectors are also common, the correctional problem is very significant, especially for "multi-coloured charts".~~

~~In the specifications which follow, emphasis is given to standardizing legends and line symbols on the black plate. The meaning of the terms "multi-coloured chart" and "standard chart" should be clear from the above.~~

**B-470.5** **Position of lights.** The ~~exact~~ position of a light (including lighthouses) should normally be shown by a five-pointed star in one of two sizes~~, the size depending on the relative importance of the light~~. ~~The larger star should be used for the majority of lights. The smaller star may be used where there are numerous minor lights, eg the corners of quays and dolphins in a harbour.~~

**P1**

The larger star should be used for the majority of lights. The smaller star may be used where there are numerous minor lights, eg the corners of quays and dolphins in a harbour.

~~A bold dot in lieu of a light star, is permissible but is not recommended because the star symbol is more distinctive (dots are used for spot heights, posts, small islets, etc) and widely used on the charts of many nations.~~

**Commentaire [c51] :** Use of a dot, which has been 'not recommended' for many years, should not be retained in INT specs, and this is supported by a clear majority.

~~Dots can be hand-drawn more easily on compilation drawings but, lacking a coloured flare, they are not sufficiently distinctive when editing and revising drawings and single colour proofs.~~

~~**Position of lights - special cases.** A light star must not be used for:~~

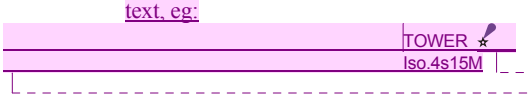
- Floating lights, see B-460 (light buoys) and B-474 (major floating lights);
- Offshore platforms, see B-445.2;
- Moiré effect lights, see B-475.8;
- Air obstruction lights on masts, chimneys, etc which are to be indicated only by legends in brackets against the features, see B-476.2;
- Strip lights, see B-478.5;
- Signal stations, see B-490.2.

**Commentaire [c52] :** Previously missed

**Navigational lights on landmarks (except lighthouses)** or other structures charted by pictorial symbols, eg water towers, wind turbines may be indicated by a light flare from the small position circle (similar to the depiction of a light buoy), eg:


**Commentaire [c53] :** DID, please insert 5011 Pc.

Alternatively, a light star may be used, with the description of the landmark inserted alongside as text, eg:




**Commentaire [c54] :** DID: please prepare graphic to justify text and symbol in normal charting layout.

To avoid clutter and to give precedence to the symbol, the term 'light', or its equivalent, must not normally be inserted against the position of a light. When a light description is unavoidably sited some distance from the light star (eg: to avoid obscuring detail close to the light; the light falls outside the chart limits - see B-470.8), it is permissible to include the **international abbreviation** **'Lt' (P1)** in the name, eg Eddystone Lt. The abbreviation may also be used in ~~such~~ legends: eg '(R Lts)' against masts, indicating air obstruction lights, 'LtHo (disused)' where no light is now exhibited.

**Commentaire [c55] :** Moved, as requested by AU, to allow alternative portrayal.

**B-470.6** **Light flares.** The point of a light flare ✎ **P11** should be about 1 mm from ~~the point showing~~ the charted position of the light.

On 'multicoloured' charts, the flare(s) should be in the colour(s) of the light, see B-470.4.

**The orientation of flares** should be such as to avoid obscuring other detail, eg symbols, soundings, text. In the case of a leading light (see B-475.6), lights in line (see B-475.6) and direction lights (see B-475.7), the flares should be oriented to seaward along the line, provided this does not obscure the front light star~~, or other detail~~. Black lines (eg transit lines, coastline, graticule) should not be broken where they cross a light flare.

**Commentaire [c56] :** Added at request of AU. Would this be a problem for multicoloured charts produced by process colour systems?

**Flares** must not be inserted against ~~minor~~ air obstruction lights (see B-476.2) ~~or~~, traffic signal stations (see B-490.2) or strip lights (see B-478.5) where light stars are usually omitted.

**B-470.7** **Names of major lights** are very important, as stated in B-450.3 and B-470.1. If a light has a name which is unrelated to any other charted feature, the name must be inserted against the position of the light on at least the largest scale charts, above or preceding the light description ~~of the character of the light~~, and should be in the same style as the light description.

If the name of a light is ~~fairly~~ obviously that of the named feature on which the light stands, eg Saint Catherine's Point, the name of the light need not be repeated above the light description. The name must be in the style appropriate to the feature, eg a headland or a shoal, and in many cases can be sited immediately above the light description. Where, as mentioned in B-470.5, a light description is unavoidably sited some distance from the light star, the name of the light should ~~normally~~ be repeated above the light description, in the same style as the light description.

**Minor lights** may be identifiable in the List of Lights and Fog Signals by a charted general name and a (possibly uncharted) descriptive term, eg Royal Pier~~, SE Head~~. Names or descriptions of individual lights of a pair of leading lights, eg 'Rear' or 'Upper', 'Front' or 'Lower', can normally be deduced from the positions shown on the chart and, to save clutter and translation, should not be inserted on paper charts.

~~Rear Lt or Upper Lt~~ ~~**P22**~~ ~~Front Lt or Lower Lt~~ ~~**P23**~~

**Commentaire [c57] :** INT1 editors please note deletion of P22, P23

For names of major floating lights, see B-474.

**B-470.8** **Lights off chart limits.** There are occasions when a light falls outside the limits of a chart and:

- it cannot be shown in a border break (see B-212.11), and
- the chart cannot be re-schemed to include it within limits.

If it is required as an aid to navigation for a mariner using the chart, it is necessary to provide the chart user with a means of plotting bearings to that light.

If the light is a **sectored light**, the sectors should be charted as normal. Sufficient details about the light should be shown on the sector arcs for identification purposes, usually including the name of the light, in addition to the light description.

For **leading lights and lights in line**, the transit lines should be charted as normal. Sufficient details about the lights should be shown on the transits for identification purposes, usually including the name of the lights, in addition to the light description.

For **all-round lights**, or lights where only one sector is visible, short magenta bearing lines at regular intervals (eg 1°) should be placed along the chart border or at some other convenient point in the portion of the chart where the light might be used for navigation. These bearing lines can be used in conjunction with a compass rose; however, if there is no convenient compass rose, two sets of bearing lines should be portrayed, which can be joined up by the chart user. The interval of bearings selected will depend on the distance the light plots off chart limits. The value of the bearing should be added for every tenth line. The length of the lines is at the cartographer's

discretion, but the tenth and fifth lines should be emphasized in the same pattern as the compass rose. The name of the light, and its description, should be inserted in magenta along the spread of lines, eg:

**P8**

Commentaire [c58] : DID: please insert symbol in accordance with the agreed wording. The legend should read: Cape Lt. Fl.5s12m23M

This portrayal may also be used for a major landmark or daymark.

**B-471 LIGHT DESCRIPTIONS**

The various elements of a complete (but abbreviated) description of a light must be charted in the order of the following paragraphs. Light descriptions may ~~in many instances~~ be **abridged** but the characteristic rhythm, number of flashes or occultations in a group, and colour (unless white) must all be charted if any details of the light are shown. ~~Minor lights may be omitted entirely from some medium scale charts, see B-472.~~

**B-471.1** **The type** of light must only be shown on charts ~~only~~ in a few special cases, in particular:

- Aeronautical lights (Aero), see B-476.
- Direction lights (Dir), see B-475.7 and B-475.8.
- Leading lights (Ldg), only where, because of scale, the two lights appear at a single position on the paper chart, and the leading line cannot be charted, see B-475.6.

~~(Some lights are not always exhibited throughout the hours of darkness and must have, for example, a warning that they are 'occasional'. This should follow the rest of the light description. See B-473).~~

**B-471.2** The principal character of a light is its rhythm (although, strictly, fixed lights and some alternating lights are not 'rhythmic'). The basic **international abbreviations** are:

| Character **of light** | **Abbreviation** | **Illustration** ( period shown) | **INT1 ref.** |
|---|---|---|---|
| Fixed | F |  | P10.1 |
| Occulting (total duration of light longer than total duration of eclipse) | Oc |  | P10.2 |
| Isophase (duration of light and eclipse equal) | Iso |  | P10.3 |
| Flashing (total duration of light shorter than total duration of darkness) | Fl |  | P10.4 |
| Long-flashing (flash 2s or longer) | LFl |  | P10.5 |
| Quick (repetition rate of 50 to 79 - usually either 50 or 60 - flashes per minute) | Q |  | P10.6 |
| Very quick (repetition rate of 80 to 159 - usually either 100 or 120 - flashes per minute) | VQ |  | P10.7 |
| Ultra quick (repetition rate of 160 or more - usually 240 to 300 - flashes per minute) | UQ |  | P10.8 |
| Morse code | eg Mo(K) |  | P10.9 |
| Fixed and flashing | FFl |  | P10.10 |
| Alternating | eg Al.WR |   | P10.11 |

**Commentaire [c59] :** AU suggests rearranging columns below as INT1. However, they serve a different purpose: INT1 the user has an abbreviation and needs to know what it means, M-4 the compiler has a light and needs to know what abbreviation to use.

**Commentaire [c60] :** DID: use improved version of tables in current M-4, but reverse letters in the diagram for alternating, to agree with description, ie W/R/W/R etc

Some examples of abbreviations derived from the basic ones:

| Character of light | Abbreviation | Illustration ( period shown) | INT1 ref. |
|---|---|---|---|
| Group occulting (showing 2 occultations) | Oc(2) |  | P10.2 |
| Composite group occulting (showing 2 + 3 occultations) | Oc(2 + 3) |  | P10.2 |
| Group flashing (showing 3 flashes) | Fl(3) |  | P10.4 |
| Composite group flashing (showing 2 + 1 flashes) | Fl(2 + 1) |  | P10.4 |
| Group quick (showing 3 quick flashes) | Q(3) |  | P10.6 |
| Interrupted quick | IQ |  | P10.6 |
| Group very quick (showing 3 very quick flashes) | VQ(3) |  | P10.7 |
| Interrupted very quick | IVQ |  | P10.7 |
| Interrupted ultra quick | IUQ |  | P10.8 |

**Commentaire [c61] :** See above re Oc. Lt

One of the principles on which the abbreviations above are based is that a capital letter is always used for the first letter of any word abbreviated; other letters are lower case. Another principle is to keep the abbreviations as compact as possible; see B-471.9.

**B-471.3** **The colour(s)** of a light must always be charted by the **international abbreviations** listed in B-450.2. They must be charted in capital letters (except for the second letter of two-letter abbreviations).

The omission of a colour abbreviation signifies that a light is white, except for sectored lights on multicoloured charts, see B-472.3. However, where there is more than one colour exhibited, as in some sector lights and in alternating lights, the abbreviation W must be included. In the case of sector lights, the longest range colours (as listed in the List of Lights and Fog Signals (LL)) are given first, eg WRG. For the charting of colours on the sectors, see B-475.

**B-471.4** **Appropriately coloured flares** ~~**or circular "patches"**~~ may be used on 'multicoloured charts', **in addition to the abbreviations,** to indicate the colour of ~~red, green and white (shown as yellow)~~ lights (see B-470.4a). For the additional use of colours on sector~~ed~~ lights see B-475.

**B-471.5** **The period.**

IALA definition:

'The time taken for the completion of all the different **phases** of a light signal.'

IALA defines a phase as:

'A visually discrete part of a light signal. It is bounded by changes between darkness and light, or between different colours, or between distinctly different luminous intensities, and it may be further discriminated by its duration.'

The period must be expressed in seconds, even where it is one minute or more, and the **international abbreviation** 's' must be used, eg:

1.2s 90s **P12**

Where periods are quoted in ~~the~~ LL to an accuracy of better than one second, they may be quoted on the chart to 0,1s, eg 1,3s, 7,5s to accord with the LL. ~~These specifications also apply to lighted buoys (B-466.4).~~

Navigators may time the period of an observed light to confirm an identification obtained firstly from the character (rhythm) and colour. The period is important in identifying a simple flashing light but less important when a light has a more distinctive character, eg group occulting. This should be taken into account when abridging a light description by omission of the period. Where practicable, periods of all lights should be shown on the largest scale charts at least.

**B-471.6** **The elevation** of a light is the vertical distance between the light source and the plane of reference for lights, as quoted in the chart title notes. It must be expressed in metres, using the **international abbreviation** 'm', eg:

12m **P13**

~~The elevation must be measured from mean sea level where there is little appreciable tide at the adjacent shoreline. Elsewhere, an appropriate High Water datum must be used.~~The elevations of lights must normally be referred to a High Water datum. Elevations should be referred to Mean Sea Level where the tidal range is not appreciable. The datum used should be clearly stated on all charts, see B-241.6.

**Commentaire [c62] :** Derived from the revised TR A2.5 (IHO CL 98/2007 refers)

**The height** of a light structure is the vertical distance between its top and ground level and should not normally be shown on paper charts. Exceptionally, where the height of the structure is particularly remarkable, it may be shown as specified in B-303, but not as part of the light description.

To a mariner, the significance of a charted elevation may be:

- In estimating or looking up (in the Geographical Range Table in LL) the distance at which a landfall light should first be sighted ~~(the elevation becomes more important as charted geographical ranges are replaced by luminous ranges, see B-471.7)~~.
- In identifying particular lights, eg leading lights, where they could be confused with other lights.
- In warning him that a light is at a relatively high elevation and is more likely to be obscured by cloud than one at a lower elevation.
- In enabling distance off a headland to be calculated, by day, if radar or other aids are not available.

~~It follows that the e~~Elevations of landfall lights should be charted, at least on the largest scale charts. Elevations of other lights where the elevation seems significant, eg leading lights, should also be charted on the largest scale charts. The elevations of minor lights are of little significance and should be omitted from charts.

**B-471.7** **The range** (distance) at which a light will be visible can be calculated either from its brightness (giving a **luminous range)** or from the eclipsing effect of the earth's curvature (giving a **geographical** range). Luminous range depends not only on the intensity of the light but on the variable conditions or meteorological visibility. IALA defines **nominal range** as:

'the luminous range of a maritime signal light in a homogeneous atmosphere having a meteorological optical range of 10 nautical miles for an observer of conventional threshold of illuminance.'

The nominal range is given in LL and must normally be used for charts. It must be expressed in sea miles, rounded to the nearest whole mile (0,5M rounded down) using the **international abbreviation** 'M', eg:

15M **P14**

Exceptionally, where the 'normal' visibility of an area differs widely from 10 miles, a non-standard luminous range may be charted (agreeing with that given in the LL), provided a note defining the range is given on the charts affected.

Geographical range (standardized on an observer's height of eye of 5 metres) should not normally be charted because it does not indicate a light's intensity and the arbitrary height of eye does not apply to all vessels. However, in areas where geographical range is known to be useful it may be inserted, where it is less than nominal range, in place of or in addition to nominal range, with a suitable explanatory note.

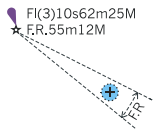
The ranges of minor lights within very restricted waters are of little significance and should generally be omitted. Where space permits, ranges of all other lights are useful to the mariner and should be charted on at least the largest scales. Ranges of landfall lights should be shown on all appropriate large and medium scale charts.

For ranges of sector lights, including those intensified on certain bearings, see B-475.

For lights with more than one range, see B-471.9.

**B-471.8** **Lights exhibited from the same structure** (or charted at the same light star).

**a. If more than one light** is exhibited from a light structure the description of the main one (eg a light visible from all directions) should ~~preferably~~ be shown on one line and the subsidiary light (eg a red sector of different character, covering a danger) on a line below.




**P42**

Two short descriptions ~~they~~ may be shown on one line linked by '&'. This also applies where two separate lights which are close together are charted by one light star, because of scale, eg:

Ldg Oc.R & F.R **P20.3**

Emergency lights should not be shown on paper charts.

**b. Disposition of lights.** Lights exhibited from the same structure which are disposed horizontally or vertically must be charted by the abbreviation '(hor)' or '(vert)' **P15**, as appropriate, immediately following the colour in the light description.

Two (or more) fixed lights **of the same colour** disposed horizontally or vertically must be charted, ~~respectively,~~ eg:

- 2F.G(hor) means that two fixed green lights are disposed horizontally
- 2F.R(vert) means that two fixed red lights are disposed vertically
- 3F.R(vert) means that three fixed red lights are disposed vertically

It is possible to show lights exhibited from the same structure arranged in other ways by means of a geometric symbol, eg:

- 3F.R(Δ) means 3 fixed red lights disposed in the shape of a triangle (the appropriate way up).

Two (or more) lights **of different colour** disposed horizontally or vertically must be charted, eg:

- F.GR(vert) means that 2 fixed lights are disposed vertically, the uppermost being green, the lower being red.
- F.RGR(hor) means that 3 fixed lights are disposed horizontally, the middle one being green.

The '&' sign is not required, as the qualifier (vert) or (hor) clearly indicates that there is more than one light. These conventions must not be used for Traffic Signals (see B-495).

**c.** If a fixed light is varied at intervals by a flash of greater intensity, it is charted as FFl, **P10.10.**

**B-471.9** **Combining the elements of a light description** must be achieved in a way that enables complex descriptions to be shown compactly. However, some spacing of the elements is needed for ease of interpretation. Full stops are specified below to ensure spacing, but the full stops may be omitted providing the spacing is retained: ~~spacing alone is adequate if desired, it is recommended that the following rules be applied:~~

**a.** Insert full stops (or spaces):

- at the end of the characteristic rhythm (except where there is a bracket);
- at the end of all colours (not between colours);
- after Al (Alternating) - although Al is not a rhythmic characteristic it is often juxtaposed with one.

**b.** Omit full stops:

- after s (seconds);
- after m (elevation);
- after M (range);
- where there is a bracket;
- at the end of the light description.

**c.** If more than one range is given in the light description for a single light, show as follows:

| | | | |
|---|---|---|---|
| eg | 15/10M | P14 | Light with two different ranges (use forward slash). |
| eg | 15-7M | P14 | Light with three or more different ranges (use hyphen). |

Colours of a light must be arranged in the same order as the ranges, with the longest range normally given first (see B-471.3). However, in the case of a FFl light, where the flash is always brighter, the ranges should be shown in the same order as the character to which they refer, eg: FFl.10/15M

**d.** Example of a full light description:

Name
Fl(3)WRG.15s21m15-11M **P16**

Fl(3) *Character of light: group flashing repeating a group of three flashes*

WRG. *Colours: white, red, green, exhibiting the different colours in defined sectors (in this example, with full stop, see B-471.9a)*

15s *Period: the time taken to exhibit one full sequence of 3 flashes and all eclipses: 15 seconds*

21m *Elevation of focal plane above height datum: 21 metres*

15-11M *Nominal range: white 15 miles, red between15 and 11 miles, green 11 miles*

(For additional remarks see B-475.5).

**B-472 LIGHT DESCRIPTIONS: ABRIDGING, OMISSION ~~OF ALL DETAILS~~**

T~~In B-471 t~~he significance of the various elements of a light description is stated in B-471. For paper charts, the order of omission of details in an abridged (shortened) description is given below. It is not ~~quite~~ the same for all types of lights. For light buoys, see B-466.4.

**B-472.1 Major lights** (ie lights intended for use at sea, usually with a range of 15 miles or more, and in outer approaches to harbours). When reducing the detail to be charted as the chart scale decreases, the following must be the order of omission:

a. Elevation of light, eg 23m
b. Period of light, eg 10s
c. Range (visibility) eg 22M
d. Character and colour.

Where useful on some smaller scale charts, a light star, major floating light symbol, or offshore platform symbol may be shown with flare and possibly name but without light description; see also C-414.1.

**B-472.2 Lights within harbours and in restricted channels.** It may be advisable to abridge light descriptions even on the largest scale charts to eliminate details of little interest to the mariner, especially where space is very limited. The order of omission must be:

a. Range
b Elevation
c. Period
d. Character and colour.

Where numerous ~~end of~~ quays, wharves, etc, ~~are uniformly lighted~~ along a river channel have similar lights, the light star and flare may be retained and a standard note covering them all may be used, eg:

LIGHTS
Light stars without legends represent two fixed lights displayed vertically. They are seen as red to port *[or starboard]* and green to starboard *[or port]* when proceeding upriver.

**B-472.3 On multicoloured charts**, the colour may be omitted from the light description, provided the colour abbreviation is shown on the sector arcs.

**B-472.4 Omission of all details (including light stars).** In general, the lights selected for insertion on a chart should be those within range of which navigation on the particular chart is possible. As a ~~rough~~ guide, only those lights visible from 15 miles and over should be inserted on charts at scales smaller than 1:500 000. B-401 to B-404 deals generally with full and partial depiction of chart detail. A well designed chart should not require any warning about omission of certain lights, but if ~~a nation wishes~~ particular~~ly to draw~~ attention to omissions is required, ~~it is recommended that~~ a brief note such as 'Only the principal lights are shown on this chart', or equivalent, is sufficient.

**B-473 LIGHTS: TIME OF EXHIBITION**

Lights are normally exhibited from about sunset to about sunrise, although, in fog, some lights may be shown during the day also. The following paragraphs refer to circumstances in which charts may~~, or need not,~~ carry warnings that a light cannot be relied on, or that its characteristics may differ from those charted. Usually such comments will be contained in List of Lights and Fog Signals (LL), but if required, may be added to the chart.

**B-473.1** **Unwatched (unmanned) lights** have in some instances been noted as such on charts. The reliability of unwatched lights is now such that using the former abbreviation '(U)' is no longer needed on charts. ~~Lights may still be accidentally extinguished but important unwatched lights are likely to have standby arrangements that can be brought into service automatically. There may also be an emergency light for service when the permanent or standby light has failed, often providing a reduced intensity or possibly different characteristics.~~

~~Where no standby or emergency arrangements are available, important lights that are unwatched (unmanned) may be indicated by means of a suitable abbreviation (U).~~

~~eg~~  ~~Fl.5s(U)~~ ~~**P53**~~

~~The characteristics of temporary lights put into service for a limited period eg during repair work, are not to be charted.~~

**Commentaire [c63] :** INT1 editors please note P53 to become obsolescent.

**B-473.2** **Occasional and private lights.** Some lights are exhibited only in response to a specific request or during the occurrence of a particular local condition. Examples are harbour lights shown only when required by particular vessels, eg fishing vessels, ferries and lights exhibited during military exercises. Privately-maintained lights which are not regularly exhibited, eg leading lights to a private quay, are also considered 'occasional'. **The international abbreviation** '(occas)' ~~in brackets,~~ must be inserted at the end of the light description, for all types of occasional lights, where required to be charted, eg:

 **P50**

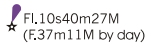
Private lights required to mark a danger such as an outfall, which are regularly exhibited, are not 'occasional'. **The international abbreviation** '(priv)', must be inserted at the end of the light description, for all types of private lights, where required to be charted, eg: ~~They may have the international abbreviation '(priv)', or equivalent added, eg:~~

 **P65**

For descriptions of lights used for signalling purposes, see B-490.4.

**B-473.3** **In high latitudes** lights may not be exhibited in the midsummer period, or in winter when ice closes an area to traffic. For such lights, a~~No~~ charted note is not required.

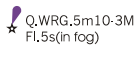
**B-473.4** **Daytime lights** of high intensity may be used in ports for such purposes as marking a leading line. Where lights are shown throughout the 24 hours without change of character no special note is required on the chart. **Where the character shown by day differs from that shown at night,** the former together with the word 'Day', or equivalent, must be shown in brackets beneath the night-time character, eg:

 **P51**

**Commentaire [c64] :** DID: use graphic from latest version of M-4, including use of Univers type

**B-473.5** **Fog lights** may be exhibited by day in reduced visibility. They can be synchronized with audible (sound) fog signals so that an estimate of range can be made. The fog light description, together

with the word 'Fog', or equivalent, must be shown in brackets beneath the main light character, eg:




**P52**

**Commentaire [c65] :** DID: use graphic from latest version of M-4

For Fog detector lights, see B-477.

**B-473.6** **Temporary lights** should not normally be charted. However, if required to be charted, the **international abbreviation** '(temp)' may be added to the light description, eg:


**P54**

**B-473.7** **Extinguished lights.** A light which is known to be temporarily extinguished, or even destroyed, may be marked by the **international abbreviation** '(exting)' if there is a possibility that it will be re-established, eg:


**P55**

## B-474 MAJOR FLOATING LIGHTS

**B-474.1** **Major floating lights** are generally classed as those with a nominal range in excess of 10 nautical miles. Special circumstances, eg an isolated location, may mean that a floating light of lower range is given this status. The structure on which the light is fixed will ~~usually~~ be a light vessel, a major light float or a LANBY (Large Automatic Navigational Buoy, which is a type of superbuoy; see B-460.4).

**B-474.2** **The symbol for a major floating light** must be

**P6**

The colour of the structure does not indicate on which side it should be passed and therefore should not be charted (this is consistent with the omission of colour from major shore light structures on paper charts). Details of the structure may be found in List of Lights and Fog Signals (LL).

**B-474.3** **The name of the light** must be given, in sloping lettering, on all large and medium-scale charts and must be in the same form as that painted on the structure. It should ~~normally~~ be placed above the light description, space permitting.

**B-474.4** **The light description**, which should be in sloping lettering, must otherwise conform to the specifications for shore lights, including the charting of both height and range on larger-scale charts (see B-470 to B-473). The heights of lights are, of course, above sea level rather than above a fixed datum. Riding lights (lights shown by an anchored or moored vessel), which are of relatively low power, should not be charted.

~~**B-474.5** **Watch (or station) buoys** are sometimes moored near manned light-vessels to give crews an indication of dragging. They are normally unlit and may be moored up to a mile from the light-vessel. They should be shown on at least the largest scale charts because they are a collision hazard at night or in fog.~~

## B-475 SECTOR LIGHTS AND OTHERS NOT VISIBLE ALL ROUND

**Commentaire [c66] :** This section has been rearranged. INT1 editors need to check the M-4 references.

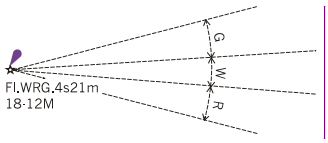
An all-round (or omni-directional) light is one that presents the same character over the whole horizon of interest to marine navigation. Where a large-scale chart shows a light without sector or leading lines (or where the light description does not indicate different sectors, 'Ldg' or 'Dir') the mariner will assume that it is an all-round light. If a light is not visible on some bearings, or changes

its character as the bearing changes, this must be shown, usually by inserting sector limits and arcs on at least the largest scale charts.

In the following specifications 'sector limit' is used to denote the line or bearing of a light where the character changes or the light is obscured. 'Sector arc' is used to denote the curved line against which the character of the light in that sector is inserted. In practice, on most lights there is a small 'angle of uncertainty' between sectors where, for example, the colour is indefinite, or at the edge of the arc of visibility, the intensity appears to be reduced. It is impracticable to indicate the angle of uncertainty on charts although, exceptionally a 'faint sector' may be represented, see B-475.3. It is possible, on certain lights which are specially designed to show a narrow sector with very small angles of uncertainty, to indicate this fact by using the abbreviation 'Dir' for 'Directional light': see B-475.7.

There are many different types of light visible on certain bearings only. The following specifications list the main ones, starting with the simpler cases.

**B-475.1** **Symbols for sector limits and sector arcs.** Limits of sectors and arcs should be charted as fine dashed lines (about 10 dashes to 10mm), except for fairway sector limits, see B-475.5. Small arrowheads should be inserted at the ends of the sector arcs, eg:




**P40.1**

**Commentaire [c67] :** DID: use latest version of graphic from M-4 (currently shown as P40)

Sector limits should cover the area where they are useful to mariners. They must not extend beyond the nominal range of a light. Very short sector arcs may be omitted.

**Where light is deliberately restricted from a sector**, it must be shown without an arc, eg:

**P44**

**Commentaire [c68] :** DID: please insert P44 graphic

**On 'multicoloured' charts,** the sector limits may be shown as fine continuous lines, emphasized by colour if required. Sector arcs may be shown solely by coloured arcs, (together with an abbreviation for the colour or character of the light, see B-475.5), eg:

**P40.2**

**Commentaire [c69] :** DID: please insert multicolour version of graphic.

For details of lights on multicoloured charts, see B-470.4a. ~~No sector limits may extend beyond the nominal range of a light.~~

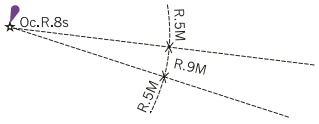
**B-475.2** **Legends on sector arcs**~~, as specified in the following paragraphs,~~ must be ~~in abbreviated form, preferably using only the~~ **international abbreviations**, see B-450.2 and B-471.

Where sectors are differentiated by colour only, the abbreviations for colours must be inserted on the sector arcs, (including on 'multicoloured' charts where coloured arcs may be used **in addition** to the abbreviations, see B-470.4a). Where sectors are very wide and there is a risk of a single abbreviation being 'lost' in the charted detail, the abbreviation may be repeated at intervals. Light descriptions on sector arcs should not be significantly inverted (to avoid reading upside down).

Where sectors are differentiated by the use of various rhythms, the abbreviations for the rhythms must be inserted on the sector arcs, together with the colour where necessary.

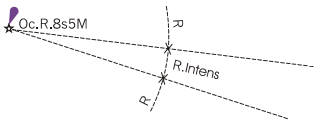
The range of each sector may also be inserted on the sector arcs, following the character or colour, and omitted from the light description at the light star.

**Where a light is intensified** in a sector, the ranges of all the sectors should be shown on the sector arcs, eg:




**P46**

If this is impracticable for any reason, the **international abbreviation** 'Intens' ~~or equivalent~~ should be used, as appropriate, eg:

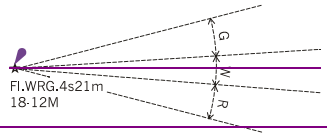



P46

Commentaire [c70] : DID: please amend light description in this graphic to Oc.R.8s9/5M

In exceptional cases where there could be confusion, full details including the name of the light may be shown on a sector arc. This also applies where it is necessary to show a sector of a light although the light itself lies beyond the limit of the chart, see B-470.8.

~~**Legends (light descriptions) at positions of lights:** Light descriptions at light stars must generally follow the specifications in B-471 and B-472. Colours must be charted in the order WRG eg:~~




~~P40~~

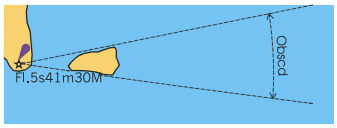
~~Ranges may be omitted when shown on sector arcs (and in restricted waters where the ranges are of little significance). Where ranges are given in the main light description it is recommended that if two different ranges only are concerned they be shown, eg:~~

~~15/10 M P14~~

~~and if three or more ranges are concerned they be shown, eg:~~

~~15-7 M P14 (longest to shortest)~~

**B-475.3** **All-round lights partially obscured by obstructions.** The arc over which a ~~particular (major)~~ light is visible may be obscured by an obstruction, such as higher land. To alert the mariner to this deficiency (unless it is obvious) a sector limit, corresponding as closely as practicable to the bearing on which the light disappears, should be inserted on ~~the~~ large-scale charts, together with the **international abbreviation** 'Obscd' ~~, or equivalent,~~ on the obscured sector arc, eg:



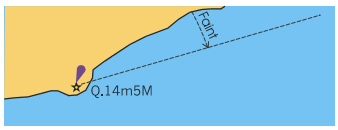

P43

Commentaire [c71] : DID, use graphic from latest version of M-4

Details of obscured arcs are normally ~~to be~~ taken from List of Lights and Fog Signals (LL). Where visibility is obscured by sloping land close to the light, the arc of visibility will increase with distance offshore so this should be taken into account when deciding where the lines should be drawn.

Where an arc of visibility is deliberately restricted (ie the light is not an all-round one) the above representation must not be used; see B-475.1.

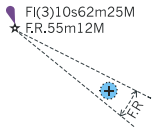
A decrease in the apparent intensity of a light may occur in the case of partial obstructions, such as vegetation. Where particularly important, an arc may be labelled with the word 'Faint' or equivalent, eg:




P45

For faint sectors on multicoloured charts, see B-470.4a.

**B-475.4** **Sector light marking a danger.** In some waters it is common to use a red subsidiary light to 'cover' a danger; see also B-471.8. The sector limits should extend at least as far as the danger, but must not extend beyond the nominal range of the subsidiary light. The character of the subsidiary light, eg 'F.R', should be inserted on the arc of visibility. The full description of the subsidiary light, including its range, must be given at the position of the light, below the description of the main (all-round) light, eg:

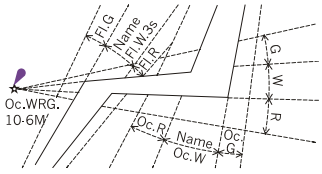



**P42**

In other cases, the main light itself may have a red sector over the danger; in such cases a single light description, eg 'Fl.WR', must be used and all sectors portrayed if scale permits.

**B-475.5** **Sector lights marking fairways.** ~~**White fairway sectors flanked by red and green sectors, or sectors with different rhythms**~~

**Sector limits and sector arcs:** where a narrow light ~~fairway~~ sector marks a fairway ~~leads~~ between off-lying dangers, the sector limits marking the edges of the fairway should be long enough to show the extent of the channel, see B-432.1. The fairway may include a number of 'legs' demarcated by white sectors from more than one light. In such cases, ~~and the approximate margin of safety provided by keeping to the fairway sector. O~~on charts where the sector limits are normally shown by fine dashed lines, those lengths of the sector limits which mark the sides of the fairway should be shown by fine continuous lines, in order to highlight the channel. Sector limits may also be omitted where they cross the fairway, eg:




**P41.1**

**On 'multicoloured' charts** the fairway edges may be emphasized by the use of a yellow/orange line in addition to and inside of the black continuous lines, eg:

**P41.2.**

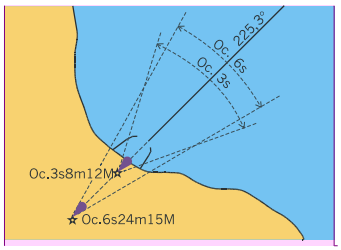
**Commentaire [c72] :** DID: please insert multicolour version

**B-475.6** **Leading lights and lights in line.** For guidance on the portrayal of leading lines and associated legends, see B-433 ~~specifies the charting of leading lines and associated legends on the lines but does not cover the charting of arcs of visibility and legends specific to lights.~~

The 'in-line' symbol should not be used where only the bearing is shown on the transit.

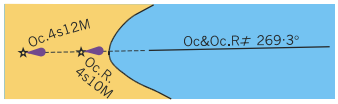
Light flares should be oriented along the transit line for all leading lights or lights in line, unless the flare would thereby obscure the front light or other important detail. Where detail may otherwise be obscured, the flare should be orientated as close as possible to the transit line.

Where a chart shows lights with a leading line it will be assumed by the mariner that the lights are, to some extent, special purpose ones and not necessarily all-round lights; therefore it is not necessary to show the arcs of visibility unless there is a good reason for doing so (eg: the light has other sectors which are not visible on the leading line, the leading sectors are much wider than the actual lead). Where it is required to show the arcs of visibility, the legends on the sector arcs must repeat as much of the light description as necessary (including, possibly, the names of the lights), see B-475.2. Relatively uninformative legends such as 'Arc of visibility' must be avoided if possible.




**P20.1**

**Commentaire [c73] :** DID: please ensure for all graphics that the black lines (coastline, transit lines…) continue under the flares.



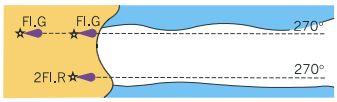

**P20.2**

In the examples above, the cartographer will determine how much of the light details will be shown on the arc, on the lead and at the light star. (The order of the marks is unimportant). It should not usually be necessary to duplicate the information, see B-433.2.

If the scale is too small to show both light stars on a paper chart, a light star should be shown in the position of the rear light, with the description linked by '&', eg: Oc.W&R. Where the representation may leave the mariner in doubt whether a light is a leading light (eg if the scale is too small to show the leading line), the **international abbreviation 'Ldg'** must precede the light description, eg:


**P20.3** (on small-scale charts)

Lights in line marking a danger or a limit may be charted similarly except that the abbreviation 'Ldg' must not be used, and the transit (or clearing) line must be dashed throughout, eg:



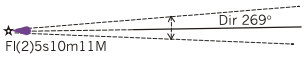

**P21**

For leading lights and lights in line which are off chart limits, see B-470.8.

**B-475.7** **Direction (or directional) lights** of several types are in use but all have in common a very narrow sector intended to mark a direction to be followed. The narrow sector may be flanked by: ~~(a) darkness or unintensified light, or (b) sectors of different colour or character.~~

**a. Unlit sectors or unintensified light**. The centre line of the sector must be charted in a manner similar to a leading line (see B-433) but with the **international abbreviation** 'Dir', and the course to

be followed, against the line, eg:

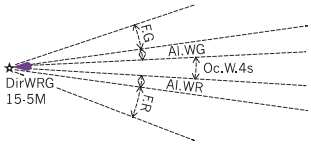



**P30.1**


**P30.2**

The abbreviation 'Dir' should only be used in the light description at the position of the light ~~only~~ if the course line cannot be charted.

**b. Sectors of different colour or character**. Some direction lights are so precise that a complete colour change at a sector boundary occurs over an angle of less than 1 minute (0.02°) ~~in most models~~. This corresponds to a lateral distance of just 1 metre at a viewing distance of 3.5 km. In addition the intensity may be maintained right to the edge of the beam, and does not reduce the further the observer is away from the axis. The sector limits and arcs must be charted, if possible, in the same way as a sectored light (see B-475.1). However, 'Dir' may be inserted at the beginning of the light description, where appropriate, to inform the navigator that the fairway sector has a particularly precise 'cut-off' or very small angle of uncertainty (unlike the average fairway sector), eg:




**P30.3**

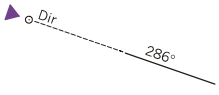
**P30.4**

In the example shown, the light oscillates from side to side, so that between the fixed colour sectors, there is a narrow sector of alternating colour.

In addition to the sectors, the centre line of the leading sector may be charted in a manner similar to a leading line (see B-433), but with the **international abbreviation** 'Dir', and the course to be followed, against the line.

**B-475.8** **A moiré effect mark (or variable arrow mark)** is a short-range (normally up to 2 km) type of direction 'light'. Sodium lighting gives a yellow background to a screen (up to 3 m square) on which a vertical black line will be seen by an observer on the centreline, or variable arrow marks when course alteration is needed. The system can be used by day and night. It can also be used as a stop line (seen abeam) for vessels berthing along quays; it should not normally be charted when used for this function (except on very large-scale berthing plans).

**The symbol** must be a small black position circle with a magenta triangle (all sides of 2.5 mm) pointing in the direction which the mark faces, with the abbreviation 'Dir' (in black), eg:




**P31**

**Commentaire [c74] :** DID: please insert additional coloured version below, as example in French INT 1, but include abbreviations on arcs, against P30.4, and without flare.

The triangle is charted instead of a conventional light flare. On multicoloured charts, it should be in the appropriate colour for the light.

## B-476 AERONAUTICAL AND AIR OBSTRUCTION LIGHTS

**B-476.1** **Aeronautical (Aero) lights,** established for aeronautical navigation, may be of higher power than marine lights and visible from well offshore. Where this is known or thought likely to be the case, their characteristics should be charted (with light star and flare), eg:

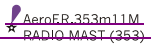

**P60**

The **international abbreviation** ~~prefixed by the **international abbreviation**~~ 'Aero' is a warning that they could be altered or extinguished without notification to mariners. ~~The cautionary note to that effect is given in the preface to LL. Eg:~~

~~AeroAl.Fl.WG.7,5s11M~~ ~~**P60**~~

**B-476.2** **Air obstruction lights** marking such features as radio towers and chimneys may, if likely to be visible from seaward, be charted ~~in one of two ways:~~

~~a. If of high intensity their characteristics should be charted in the same way as aeronautical navigation lights, ie they should be prefixed 'Aero', eg:~~




~~**P61.1**~~

~~b. If of low intensity they should be charted~~ (without light star or flare) by the appropriate ~~**descriptive legend, preferably in**~~ **international abbreviations** ~~eg R Lts~~, in brackets, against the structure, eg:


**P61.2**

## B-477 FOG DETECTOR LIGHTS

Fog detector lights may be fitted to the structure of a major light or may be established some distance from the light. Their purpose is to detect fog automatically and to switch on fog signals. There are a variety of types in use, some only visible over a narrow arc; in some cases they are liable to alteration without notice. For these reasons ~~it is recommended that~~ their characteristics should not usually be charted. However, as they may be powerful lights and, in some cases, sweep back and forth so that they could be mistaken for signals, ~~it is recommended that~~ the **international abbreviation** 'Fog Det Lt' should be inserted where appropriate on at least the larger scale charts.




**P62**

If not at the same position as a charted light, a small position circle, **B22,** should be used.

## B-478 VARIOUS SPECIAL FORMS OF LIGHTING

**B-478.1** Not currently used ~~A bearing light is one which enables its approximate bearing to be obtained without the use of a compass. Various systems can be employed, but all involve multiplying the interval of time between two specified flashes from two separate optical systems in the same light structure by a given factor, to give the bearing or its reciprocal.~~

~~It is recommended that the light is charted with standard characteristics and is not identified on the chart in any special way.~~

**B-478.2** **Floodlighting** of a structure (eg a pier, pier-head lighthouse) or a danger close to navigable water, should be indicated ~~either~~ by the symbol:

 or 

**P63**

**Commentaire [c75] :** DID, please insert additional yellow version of the symbol.

The symbol must be in magenta, or yellow/orange on 'multicoloured' charts. Alternatively it may be indicated ~~or~~ by the legend '(illuminated)', the **international abbreviation** '(illum)', or equivalent, against the structure or feature being lit, on the appropriate side if known. ~~The symbol should be in magenta, but may be in yellow/orange on 'multi-coloured' charts.~~

Exceptionally on very large scale charts, if it is required to chart the actual floodlight, this should be by means of a small position circle and the legend 'Floodlight', or equivalent.

**B-478.3** **Synchronized lights.** A group of lights, usually on buoys or beacons, which:

- all flash at the same time (synchronous),
- flash one after another in series (sequential),
- are a combination of the above,

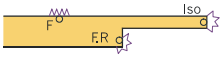
are referred to as 'synchronized' lights. They often occur on lateral marks in a channel, or special marks marking an area or feature. Details of their type of synchronicity are best given in the List of Lights and Fog Signals, Sailing Directions and/or a chart note. The **international abbreviation** '(sync)' may be added to the light description, eg:


**P66**

**B-478.4** Not currently used
~~For light structures as daymarks, see B-457.~~

**B-478.5** **A Strip light~~s (bordures lumineuses).~~** ~~These are found mainly in French waters. A "bordure lumineuse" is described~~ ~~is a light whose source~~ has a linear form, usually horizontal, which can reach a length of several metres. This type of light may be used, eg on heads of piers, along quay walls, at the corners of quays, on dolphins, replacing or in addition to a painted strip. Occasionally they are disposed vertically to enable bearings to be taken from them; in such cases, the legend '(vert)' should be included in the light description. A strip light may have a rhythmic character and may be coloured. The light-description should be in conventional form.

**The symbol** for a strip light must be a small black position circle ~~and normal light-description in abbreviated form,~~ with a serrated (zig-zag) line in magenta, or the appropriate colour on 'multicoloured' charts, instead of the conventional flare, eg:




**P64**