AIRPORT STANDARDS DIRECTIVE 502
[ASD 502]

VISUAL AIDS FOR NAVIGATION - SIGNS
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<th>Amendment Number</th>
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INTRODUCTION

1. In exercise of the powers conferred by regulation 12 (c) of the Civil Aviation (Aerodrome Operations) Regulations 2016, the Director General makes this Airport Standards Directive.


3. The achievement of safe and efficient aircraft taxiing and ground movement at aerodromes requires the provision of a system of signs for the use of pilot and vehicle drivers on the movement area.

4. Pilots and vehicle drivers use the signs to identify their position on the movement area. By relating this data to ground map information available in the cockpit or in the vehicle, they can ensure that they are on their assigned route at all times.

5. At some locations, the signs convey mandatory instructions related to that particular position, thus contributing to the safety of operations.

6. This Directive has been written in general terms. Specific advice could be obtained from the Authority at:

   Department of Civil Aviation
   Airport Standards Division
   Level 1 Block Podium B
   No. 27 Persiaran Perdana, Precinct 4
   62618 Putrajaya.
   Phone: 03-88714000
   Fax: 03-88714335

OBJECTIVE

7. This Directive specified the application, location and characteristics of all signs for mandatory and information signs that meet the ICAO Annex 14 Vol. 1 requirements.

8. This Directive also prescribes the regularity and safety of aviation and it is necessary that all signs have high integrity and reliability.
APPLICABILITY

9. The specification in this Directive shall apply to all aerodromes open to public transport aircraft.

AUTHORITY

10. The Authority referred to this Directive is the Director General of Civil Aviation.

VISUAL AIDS FOR NAVIGATION

11. Signs

11.1 General

Note.— Signs shall be either fixed message signs or variable message signs. Guidance on signs is contained in the Aerodrome Design Manual (Doc 9157), Part 4

Application

11.1.1 Signs shall be provided to convey a mandatory instruction, information on a specific location or destination on a movement area or to provide other information to meet the requirements of ICAO Annex 14 Volume 1, clause 9.8.1.

Note.— See ICAO Annex 14 Volume 1, clause 5.2.17 for specifications on information marking.

11.1.2 A variable message sign should be provided where

(a) the instruction or information displayed on the sign is relevant only during a certain period of time; and/or

(b) there is a need for variable predetermined information to be displayed on the sign to meet the requirements of ICAO Annex 14 Volume 1, clause 9.8.1.
11.1.3 Signs shall be frangible. Those located near a runway or taxiway shall be sufficiently low to preserve clearance for propellers and the engine pods of jet aircraft. The installed height of the sign shall not exceed the dimension shown in the appropriate column of Table B1-1.

11.1.4 Signs shall be rectangular, as shown in Figures A1-1 and A1-2 with the longer side horizontal.

11.1.5 The only signs on the movement area utilizing red shall be mandatory instruction signs.

11.1.6 The inscriptions on a sign shall be in accordance with the provisions of Appendix A.

11.1.7 Signs shall be illuminated in accordance with the provisions of Appendix A when intended for use:

(a) in runway visual range conditions less than a value of 800 m; or

(b) at night in association with instrument runways; or

(c) at night in association with non-instrument runways where the code number is 3 or 4.

11.1.8 Signs shall be retroreflective and/or illuminated in accordance with the provisions of Appendix A when intended for use at night in association with non-instrument runways where the code number is 1 or 2.

11.1.9 A variable message sign shall show a blank face when not in use.

11.1.10 In case of failure, a variable message sign shall not provide information that could lead to unsafe action from a pilot or a vehicle driver.

11.1.11 The time interval to change from one message to another on a variable message sign should be as short as practicable and should not exceed 5 seconds.
11.2 **Mandatory instruction signs**

Note.— See Figure A1-1 for pictorial representation of mandatory instruction signs and Figure A1-3 for examples of locating signs at taxiway/runway intersections.

**Application**

11.2.1 A mandatory instruction sign shall be provided to identify a location beyond which an aircraft taxiing or vehicle shall not proceed unless authorized by the aerodrome control tower.

11.2.2 Mandatory instruction signs shall include runway designation signs, category I, II or III holding position signs, runway-holding position signs, road-holding position signs and NO ENTRY signs.

Note.— See 11.7 for specifications on road-holding position signs.

11.2.3 A pattern “A” runway-holding position marking shall be supplemented at a taxiway/runway intersection or a runway/runway intersection with a runway designation sign.

11.2.4 A pattern “B” runway-holding position marking shall be supplemented with a category I, II or III holding position sign.

11.2.5 A pattern “A” runway-holding position marking at a runway-holding position established in accordance with ICAO Annex 14 Volume 1, clause 3.12.3 shall be supplemented with a runway-holding position sign.

Note.— See ICAO Annex 14 Volume 1, clause 5.2.10 for specifications on runway-holding position marking.

11.2.6 A runway designation sign at a taxiway/runway intersection should be supplemented with a location sign in the outboard (farthest from the taxiway) position, as appropriate.

Note.— See 11.3 for characteristics of location signs.

11.2.7 A NO ENTRY sign shall be provided when entry into an area is prohibited.


**Location**

11.2.8 A runway designation sign at a taxiway/runway intersection or a runway/runway intersection shall be located on each side of the runway-holding position marking facing the direction of approach to the runway.

11.2.9 A category I, II or III holding position sign shall be located on each side of the runway-holding position marking facing the direction of the approach to the critical area.

11.2.10 A NO ENTRY sign shall be located at the beginning of the area to which entrance is prohibited on each side of the taxiway as viewed by the pilot.

11.2.11 A runway-holding position sign shall be located on each side of the runway-holding position established in accordance with ICAO Annex 14 Volume 1, clause 3.12.3, facing the approach to the obstacle limitation surface or ILS/MLS critical/sensitive area, as appropriate.

**Characteristics**

11.2.12 A mandatory instruction sign shall consist of an inscription in white on a red background.

11.2.13 Where, owing to environmental or other factors, the conspicuity of the inscription on a mandatory instruction sign needs to be enhanced, the outside edge of the white inscription should be supplemented by a black outline measuring 10 mm in width for runway code numbers 1 and 2, and 20 mm in width for runway code numbers 3 and 4.

11.2.14 The inscription on a runway designation sign shall consist of the runway designations of the intersecting runway properly oriented with respect to the viewing position of the sign, except that a runway designation sign installed in the vicinity of a runway extremity may show the runway designation of the concerned runway extremity only.

11.2.15 The inscription on a category I, II, III or joint II/III holding position sign shall consist of the runway designator followed by CAT I, CAT II, CAT III or CAT II/III, as appropriate.
11.2.16 The inscription on a NO ENTRY sign shall be in accordance with Figure A1-1.

11.2.17 The inscription on a runway-holding position sign at a runway-holding position established in accordance with ICAO Annex 14 Volume 1, clause 3.12.3 shall consist of the taxiway designation and a number.

11.2.18 Where appropriate, the following inscriptions/symbol shall be used:

<table>
<thead>
<tr>
<th>Inscription/symbol</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runway designation of runway extremity</td>
<td>To indicate a runway-holding position at a runway extremity</td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>Runway designation of both extremities of a runway</td>
<td>To indicate a runway-holding position located at other taxiway / runway intersections or runway / runway intersections</td>
</tr>
<tr>
<td>25 CAT I (Example)</td>
<td>To indicate a category I runway-holding position at the threshold of runway 25</td>
</tr>
<tr>
<td>25 CAT II (Example)</td>
<td>To indicate a category II runway-holding position at the threshold of runway 25</td>
</tr>
<tr>
<td>25 CAT III (Example)</td>
<td>To indicate a category III runway-holding position at the threshold of runway 25</td>
</tr>
<tr>
<td>25 CAT II/III (Example)</td>
<td>To indicate a joint category II/III runway - holding position at the threshold of runway 25</td>
</tr>
<tr>
<td>NO ENTRY symbol</td>
<td>To indicate that entry to an area is prohibited</td>
</tr>
</tbody>
</table>
11.3 Information signs

Note.— See Figure A1-2 for pictorial representations of information signs.

Application

11.3.1 An information sign shall be provided where there is an operational need to identify by a sign, a specific location, or routing (direction or destination) information.

11.3.2 Information signs shall include: direction signs, location signs, destination signs, runway exit signs, runway vacated signs and intersection take-off signs.

11.3.3 A runway exit sign shall be provided where there is an operational need to identify a runway exit.

11.3.4 A runway vacated sign shall be provided where the exit taxiway is not provided with taxiway centre line lights and there is a need to indicate to a pilot leaving a runway the perimeter of the ILS/MLS critical/sensitive area or the lower edge of the inner transitional surface, whichever is farther from the runway centre line.

Note.— See ICAO Annex 14 Volume 1, clause 5.3.16 for specifications on colour coding taxiway centre line lights.

11.3.5 An intersection take-off sign should be provided when there is an operational need to indicate the remaining take-off run available (TORA) for intersection take-offs.

11.3.6 Where necessary, a destination sign should be provided to indicate the direction to a specific destination on the aerodrome, such as cargo area, general aviation, etc.
11.3.7 A combined location and direction sign shall be provided when it is intended to indicate routing information prior to a taxiway intersection.

11.3.8 A direction sign shall be provided when there is an operational need to identify the designation and direction of taxiways at an intersection.

11.3.9 A location sign should be provided at an intermediate holding position.

11.3.10 A location sign shall be provided in conjunction with a runway designation sign except at a runway/runway intersection.

11.3.11 A location sign shall be provided in conjunction with a direction sign, except that it may be omitted where an aeronautical study indicates that it is not needed.

11.3.12 Where necessary, a location sign should be provided to identify taxiways exiting an apron or taxiways beyond an intersection.

11.3.13 Where a taxiway ends at an intersection such as a “T” and it is necessary to identify this, a barricade, direction sign and/or other appropriate visual aid should be used.

Location

11.3.14 Except as specified in 11.3.16 and 11.3.24 information signs shall, wherever practicable, be located on the left-hand side of the taxiway in accordance with Table B1-1.

11.3.15 At a taxiway intersection, information signs shall be located prior to the intersection and in line with the taxiway intersection marking. Where there is no taxiway intersection marking, the signs shall be installed at least 60 m from the centre line of the intersecting taxiway where the code number is 3 or 4, and at least 40 m where the code number is 1 or 2.

Note.— A location sign installed beyond a taxiway intersection may be installed on either side of a taxiway.
11.3.16 A runway exit sign shall be located on the same side of the runway as the exit is located (i.e. left or right) and positioned in accordance with Table B1-1.

11.3.17 A runway exit sign shall be located prior to the runway exit point in line with a position at least 60 m prior to the point of tangency where the code number is 3 or 4, and at least 30 m where the code number is 1 or 2.

11.3.18 A runway vacated sign shall be located at least on one side of the taxiway. The distance between the sign and the centre line of a runway shall be not less than the greater of the following:

(a) the distance between the centre line of the runway and the perimeter of the ILS/MLS critical/sensitive area; or

(b) the distance between the centre line of the runway and the lower edge of the inner transitional surface.

11.3.19 Where provided in conjunction with a runway vacated sign, the taxiway location sign shall be positioned outboard of the runway vacated sign.

11.3.20 An intersection take-off sign shall be located at the left-hand side of the entry taxiway. The distance between the sign and the centre line of the runway shall be not less than 60 m where the code number is 3 or 4, and not less than 45 m where the code number is 1 or 2.

11.3.21 A taxiway location sign installed in conjunction with a runway designation sign shall be positioned outboard of the runway designation sign.

11.3.22 A destination sign should not normally be collocated with a location or direction sign.

11.3.23 An information sign other than a location sign shall not be collocated with a mandatory instruction sign.

11.3.24 A direction sign, barricade and/or other appropriate visual aid used to identify a “T” intersection should be located on the opposite side of the intersection facing the taxiway.
Characteristics

11.3.25 An information sign other than a location sign shall consist of an inscription in black on a yellow background.

11.3.26 A location sign shall consist of an inscription in yellow on a black background and where it is a stand-alone sign shall have a yellow border.

11.3.27 The inscription on a runway exit sign shall consist of the designator of the exit taxiway and an arrow indicating the direction to follow.

11.3.28 The inscription on a runway vacated sign shall depict the pattern A runway-holding position marking as shown in Figure A1-2.

11.3.29 The inscription on an intersection take-off sign shall consist of a numerical message indicating the remaining take-off run available in metres plus an arrow, appropriately located and oriented, indicating the direction of the take-off as shown in Figure A1-2.

11.3.30 The inscription on a destination sign shall comprise an alpha, alphanumerical or numerical message identifying the destination plus an arrow indicating the direction to proceed as shown in Figure A1-2.

11.3.31 The inscription on a direction sign shall comprise an alpha or alphanumerical message identifying the taxiway(s) plus an arrow or arrows appropriately oriented as shown in Figure A1-2.

11.3.32 The inscription on a location sign shall comprise the designation of the location taxiway, runway or other pavement the aircraft is on or is entering and shall not contain arrows.

11.3.33 Where it is necessary to identify each of a series of intermediate holding positions on the same taxiway, the location sign should consist of the taxiway designation and a number.

11.3.34 Where a location sign and direction signs are used in combination:

(a) all direction signs related to left turns shall be placed on the left side of the location sign, and all direction signs
related to right turns shall be placed on the right side of the location sign, except that where the junction consists of one intersecting taxiway, the location sign may alternatively be placed on the left-hand side;

(b) the direction signs shall be placed such that the direction of the arrows departs increasingly from the vertical with increasing deviation of the corresponding taxiway;

(c) an appropriate direction sign shall be placed next to the location sign where the direction of the location taxiway changes significantly beyond the intersection; and

(d) adjacent direction signs shall be delineated by a vertical black line as shown in Figure A1-2.

11.3.35 A taxiway shall be identified by a designator comprising a letter, letters or a combination of a letter or letters followed by a number.

11.3.36 When designating taxiways, the use of the letters I, O or X and the use of words such as inner and outer should be avoided wherever possible to avoid confusion with the numerals 1, 0 and closed marking.

11.3.37 The use of numbers alone on the manoeuvring area shall be reserved for the designation of runways.

11.4 VOR aerodrome checkpoint sign

Application

11.4.1 When a VOR aerodrome checkpoint is established, it shall be indicated by a VOR aerodrome checkpoint marking and sign.

Note.—See ICAO Annex 14 Volume 1, clause 5.2.12 for VOR aerodrome checkpoint marking.
Location

11.4.2 A VOR aerodrome checkpoint sign shall be located as near as possible to the checkpoint and so that the inscriptions are visible from the cockpit of an aircraft properly positioned on the VOR aerodrome checkpoint marking.

Characteristics

11.4.3 A VOR aerodrome checkpoint sign shall consist of an inscription in black on a yellow background.

11.4.4 The inscriptions on a VOR checkpoint sign should be in accordance with one of the alternatives shown in Figure A1-4 in which:

VOR is an abbreviation identifying this as a VOR checkpoint;

116.3 is an example of the radio frequency of the VOR concerned;

147° is an example of the VOR bearing, to the nearest degree, which should be indicated at the VOR checkpoint; and

4.3 NM is an example of the distance in nautical miles to a ME collocated with the VOR concerned.

Note.— Tolerances for the bearing value shown on the sign are given in ICAO Annex 10, Volume I, Attachment E. It will be noted that a checkpoint can only be used operationally when periodic checks show it to be consistently within ±2 degrees of the stated bearing.
11.5 Aerodrome identification sign

Application

11.5.1 An aerodrome identification sign should be provided at an aerodrome where there is insufficient alternative means of visual identification.

Location

11.5.2 The aerodrome identification sign should be placed on the aerodrome so as to be legible, in so far as is practicable, at all angles above the horizontal.

Characteristics

11.5.3 The aerodrome identification sign shall consist of the name of the aerodrome.

11.5.4 The colour selected for the sign should give adequate conspicuity when viewed against its background.

11.5.5 The characters should have a height of not less than 3 m.

11.6 Aircraft stand identification signs

Application

11.6.1 An aircraft stand identification marking should be supplemented with an aircraft stand identification sign where feasible.

Location

11.6.2 An aircraft stand identification sign should be located so as to be clearly visible from the cockpit of an aircraft prior to entering the aircraft stand.
Characteristics

11.6.3 An aircraft stand identification sign should consist of an inscription in black on a yellow background.

11.7 Road-holding position sign

11.7.1 A road-holding position sign shall be provided at all road entrances to a runway.

Location

11.7.2 The road-holding position sign shall be located 1.5 m from one edge of the road (left or right as appropriate to the local traffic regulations) at the holding position.

Characteristics

11.7.3 A road-holding position sign shall consist of an inscription in white on a red background.

11.7.4 The inscription on a road-holding position sign shall be in the national language, be in conformity with the local traffic regulations and include the following:

(a) a requirement to stop; and

(b) where appropriate:

(1) a requirement to obtain ATC clearance; and

(2) location designator.

Note.— Examples of road-holding position signs are contained in the Aerodrome Design Manual (Doc 9157), Part 4.

11.7.5 A road-holding position sign intended for night use shall be retroreflective or illuminated.
12. The Appendices to this Directive shall be taken, construed, read and be part of this Directive.

DATO’ SRI AZHARUDDIN ABDUL RAHMAN
Director General
Department of Civil Aviation
Malaysia

Dated : 20 APRIL 2016
Figure A1-1. Mandatory instruction signs
Figure A1-2. Information signs
<table>
<thead>
<tr>
<th>Category</th>
<th>Sign Positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>A 27, 27 A</td>
</tr>
<tr>
<td>II</td>
<td>A 27, 27 A, 27 CAT II</td>
</tr>
<tr>
<td>III</td>
<td>A 27, 27 A, 27 CAT III</td>
</tr>
</tbody>
</table>

Figure A1-3. Examples of sign positions at taxiway/runway intersections
Figure A1-4. VOR aerodrome checkpoint sign
### APPENDIX A – VISUAL AIDS FOR NAVIGATION (TABLES)

<table>
<thead>
<tr>
<th>Code number</th>
<th>Legend</th>
<th>Face (min.)</th>
<th>Installed (max.)</th>
<th>Perpendicular distance from defined taxiway pavement edge to near side of sign</th>
<th>Perpendicular distance from defined runway pavement edge to near side of sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 or 2</td>
<td>200</td>
<td>400</td>
<td>700</td>
<td>5–11 m</td>
<td>3–10 m</td>
</tr>
<tr>
<td>1 or 2</td>
<td>300</td>
<td>600</td>
<td>900</td>
<td>5–11 m</td>
<td>3–10 m</td>
</tr>
<tr>
<td>3 or 4</td>
<td>300</td>
<td>600</td>
<td>900</td>
<td>11–21 m</td>
<td>8–15 m</td>
</tr>
<tr>
<td>3 or 4</td>
<td>400</td>
<td>800</td>
<td>1100</td>
<td>11–21 m</td>
<td>8–15 m</td>
</tr>
</tbody>
</table>

Table B1-1. Location distances for taxiing guidance signs including runway exit signs
ATTACHMENT 1 – REQUIREMENT CONCERNING DESIGN OF TAXIING GUIDANCE SIGN

1. Inscription heights shall conform to the following tabulation.

<table>
<thead>
<tr>
<th>Runway code number</th>
<th>Mandatory instruction sign</th>
<th>Information sign</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum character height</td>
<td>Runway exit and runway vacated signs</td>
</tr>
<tr>
<td>1 or 2</td>
<td>300 mm</td>
<td>300 mm</td>
</tr>
<tr>
<td>3 or 4</td>
<td>400 mm</td>
<td>400 mm</td>
</tr>
</tbody>
</table>

*Note.* Where a taxiway location sign is installed in conjunction with a runway designation sign (see 10.3.22), the character size shall be that specified for mandatory instruction signs.

2. Arrow dimensions shall be as follows:

   *Legend height* | *Stroke*  
   200 mm          | 32 mm        
   300 mm          | 48 mm        
   400 mm          | 64 mm        

3. Stroke width for single letter shall be as follows:

   *Legend height* | *Stroke*  
   200 mm          | 32 mm        
   300 mm          | 48 mm        
   400 mm          | 64 mm        

4. Sign luminance shall be as follows:

   (a) Where operations are conducted in runway visual range conditions less than a value of 800 m, average sign luminance shall be at least:

<table>
<thead>
<tr>
<th>Color</th>
<th>Luminance (cd/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>30</td>
</tr>
<tr>
<td>Yellow</td>
<td>150</td>
</tr>
<tr>
<td>White</td>
<td>300</td>
</tr>
</tbody>
</table>

   (b) Where operations are conducted in accordance with 5.4.1.7 b) and c) and 5.4.1.8, average sign luminance shall be at least:

<table>
<thead>
<tr>
<th>Color</th>
<th>Luminance (cd/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>10</td>
</tr>
<tr>
<td>Yellow</td>
<td>50</td>
</tr>
<tr>
<td>White</td>
<td>100</td>
</tr>
</tbody>
</table>

*Note.* In runway visual range conditions less than a value of 400 m, there will be some degradation in the performance of signs.
5. The luminance ratio between red and white elements of a mandatory sign shall be between 1:5 and 1:10.

6. The average luminance of the sign is calculated by establishing grid points as shown in Figure ATT-1 and using the luminance values measured at all grid points located within the rectangle representing the sign.

7. The average value is the arithmetic average of the luminance values measured at all considered grid points.

   Note.— Guidance on measuring the average luminance of a sign is contained in the Aerodrome Design Manual (Doc 9157), Part 4.

8. The ratio between luminance values of adjacent grid points shall not exceed 1.5:1. For areas on the sign face where the grid spacing is 7.5 cm, the ratio between luminance values of adjacent grid points shall not exceed 1.25:1. The ratio between the maximum and minimum luminance value over the whole sign face shall not exceed 5:1.

9. The forms of characters, i.e. letters, numbers, arrows and symbols, shall conform to those shown in Figure ATT-2. The width of characters and the space between individual characters shall be determined as indicated in Table ATT1-1.

10. The face height of signs shall be as follows:

    | Legend height | Face height (min) |
    |---------------|------------------|
    | 200 mm        | 400 mm           |
    | 300 mm        | 600 mm           |
    | 400 mm        | 800 mm           |

11. The face width of signs shall be determined using Figure ATT-3 except that, where a mandatory instruction sign is provided on one side of a taxiway only, the face width shall not be less than:

    (a) 1.94 m where the code number is 3 or 4; and

    (b) 1.46 m where the code number is 1 or 2.

   Note.— Additional guidance on determining the face width of a sign is contained in the Aerodrome Design Manual (Doc 9157), Part 4.

12. Borders

    (a) The black vertical delineator between adjacent direction signs should have a width of approximately 0.7 of the stroke width.

    (b) The yellow border on a stand-alone location sign should be approximately 0.5 stroke width.

13. The colours of signs shall be in accordance with the appropriate specifications in Attachment 2.
Figure ATT-1. Grid points for calculating average luminance of a sign

Note 1.— The average luminance of a sign is calculated by establishing grid points on a sign face showing typical inscriptions and a background of the appropriate colour (red for mandatory instruction signs and yellow for direction and destination signs) as follows:

(a) Starting at the top left corner of the sign face, establish a reference grid point at 7.5 cm from the left edge and the top of the sign face.

(b) Create a grid of 15 cm spacing horizontally and vertically from the reference grid point. Grid points within 7.5 cm of the edge of the sign face shall be excluded.

(c) Where the last point in a row/column of grid points is located between 22.5 cm and 15 cm from the edge of the sign face (but not inclusive), an additional point shall be added 7.5 cm from this point.

(d) Where a grid point falls on the boundary of a character and the background, the grid point shall be slightly shifted to be completely outside the character.

Note 2.— Additional grid points may be required to ensure that each character includes at least five evenly spaced grid points.

Note 3.— Where one unit includes two types of signs, a separate grid shall be established for each type.
Figure ATT-2  Forms of characters
Figure ATT-2 (cont.)
Figure ATT-2 (cont.)
Figure ATT-2 Runway vacated sign

Figure ATT-2 NO ENTRY sign

Note.— Existing NO ENTRY signs not conforming to these dimensions are to be replaced not later than 1 January 2012.
Note 1.— The arrow stroke width, diameter of the dot, and both width and length of the dash shall be proportioned to the character stroke widths.

Note 2.— The dimensions of the arrow shall remain constant for a particular sign size, regardless of orientation.

Figure ATT-2  Arrow, dot and dash

A. Sign with two runway designators  B. Sign with one runway designator

Figure ATT-2  Sign dimensions
<table>
<thead>
<tr>
<th>Preceding Letter</th>
<th>Following Letter</th>
<th>Code number</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>2</td>
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**INSTRUCTIONS**

1. To determine the proper SPACE between letters or numerals, obtain the code number from table a) or b) and enter table c) for that code number to the desired letter or numerical height.

2. The space between words or groups of characters forming an abbreviation or symbol should be equal to 0.5 to 0.75 of the height of the characters used except that where an arrow is located with a single character such as "A +", the space may be reduced to not less than one quarter of the height of the character in order to provide a good visual balance.

3. Where the numeral follows a letter or vice versa use Code 1.

4. Where a hyphen, dot, or diagonal stroke follows a character or vice versa use Code 1.

---

Table ATT1-1. Letter and numeral widths and space between letters or numerals
1.0 Colours for markings, signs and panels

Note 1.— The specifications of surface colours given below apply only to freshly coloured surfaces. Colours used for markings, signs and panels usually change with time and therefore require renewal.


Note 3.— The specifications recommended in 3.4 for transilluminated panels are interim in nature and are based on the CIE specifications for transilluminated signs. It is intended that these specifications will be reviewed and updated as and when CIE develops specifications for transilluminated panels.

1.1 The chromaticities and luminance factors of ordinary colours, colours of retroreflective materials and colours of transilluminated (internally illuminated) signs and panels shall be determined under the following standard conditions:

(a) angle of illumination: 45°;
(b) direction of view: perpendicular to surface; and
(c) illuminant: CIE standard illuminant D65.

1.2 Recommendation.— The chromaticity and luminance factors of ordinary colours for markings and externally illuminated signs and panels should be within the following boundaries when determined under standard conditions.

CIE Equations (see Figure ATT-1):

(a) Red
   Purple boundary \( y = 0.345 - 0.051x \)
   White boundary \( y = 0.910 - x \)
   Orange boundary \( y = 0.314 + 0.047x \)
   Luminance factor \( \beta = 0.07 \) (mnm)

(b) Orange
   Red boundary \( y = 0.285 + 0.100x \)
   White boundary \( y = 0.940 - x \)
   Yellow boundary \( y = 0.250 + 0.220x \)
   Luminance factor \( \beta = 0.20 \) (mnm)

(c) Yellow
   Orange boundary \( y = 0.108 + 0.707x \)
   White boundary \( y = 0.910 - x \)
   Green boundary \( y = 1.35x - 0.093 \)
   Luminance factor \( \beta = 0.45 \) (mnm)

(d) White
   Purple boundary \( y = 0.010 + x \)
   Blue boundary \( y = 0.610 - x \)
   Green boundary \( y = 0.030 + x \)
   Yellow boundary \( y = 0.710 - x \)
Luminance factor $\beta = 0.75$ (mnm)

(e) Black
Purple boundary $y = x - 0.03$
Blue boundary $y = 0.57 - x$
Green boundary $y = 0.05 + x$
Yellow boundary $y = 0.74 - x$
Luminance factor $\beta = 0.03$ (max)

(f) Yellowish green
Green boundary $y = 1.317x + 0.4$
White boundary $y = 0.91 - x$
Yellow boundary $y = 0.867x + 0.4$

(g) Green
Yellow boundary $x = 0.313$
White boundary $y = 0.243 + 0.670x$
Blue boundary $y = 0.493 - 0.524x$
Luminance factor $\beta = 0.10$ (mnm)

Note.— The small separation between surface red and surface orange is not sufficient to ensure the distinction of these colours when seen separately.

1.3 **Recommendation.**— The chromaticity and luminance factors of colours of retroreflective materials for markings, signs and panels should be within the following boundaries when determined under standard conditions.

CIE Equations (see Figure ATT-2):

(a) Red
Purple boundary $y = 0.345 - 0.051x$
White boundary $y = 0.910 - x$
Orange boundary $y = 0.314 + 0.047x$
Luminance factor $\beta = 0.03$ (mnm)

(b) Orange
Red boundary $y = 0.265 + 0.205x$
White boundary $y = 0.910 - x$
Yellow boundary $y = 0.207 + 0.390x$
Luminance factor $\beta = 0.14$ (mnm)

(c) Yellow
Orange boundary $y = 0.160 + 0.540x$
White boundary $y = 0.910 - x$
Green boundary $y = 1.35x - 0.093$
Luminance factor $\beta = 0.16$ (mnm)

(d) White
Purple boundary $y = x$
Blue boundary $y = 0.610 - x$
Green boundary $y = 0.040 + x$
Yellow boundary $y = 0.710 - x$
Luminance factor $\beta = 0.27$ (mnm)
1.4 **Recommendation.** The chromaticity and luminance factors of colours for luminescent or transilluminated (internally illuminated) signs and panels should be within the following boundaries when determined under standard conditions.

**CIE Equations (see Figure ATT-3):**

(a) **Red**
- Purple boundary \( y = 0.345 - 0.051x \)
- White boundary \( y = 0.910 - x \)
- Orange boundary \( y = 0.314 + 0.047x \)
- Luminance factor \( \beta = 0.07 \) (mnm)
- Relative luminance to white \( 5\% \) (mnm)
- (night condition)

(b) **Yellow**
- Orange boundary \( y = 0.108 + 0.707x \)
- White boundary \( y = 0.910 - x \)
- Green boundary \( y = 1.35x - 0.093 \)
- Luminance factor \( \beta = 0.45 \) (mnm)
- Relative luminance to white (night condition) \( 30\% \) (mnm)

(c) **White**
- Purple boundary \( y = 0.010 + x \)
- Blue boundary \( y = 0.610 - x \)
- Green boundary \( y = 0.030 + x \)
- Yellow boundary \( y = 0.710 - x \)
- Luminance factor \( \beta = 0.75 \) (mnm)
- Relative luminance to white (night condition) \( 100\% \)

(d) **Black**
- Purple boundary \( y = x - 0.030 \)
Blue boundary: $y = 0.570 - x$
Green boundary: $y = 0.050 + x$
Yellow boundary: $y = 0.740 - x$
Luminance factor: $\beta = 0.03$ (max)
Relative luminance to white (night condition): 0% (mnm)
Relative luminance to white (night condition): 2% (max)

(e) Green
Yellow boundary: $x = 0.313$
White boundary: $y = 0.243 + 0.670x$
Blue boundary: $y = 0.493 - 0.524x$
Luminance factor: $\beta = 0.10$ minimum (day conditions)
Relative luminance: 5% (minimum)
to white (night conditions) 30% (maximum)
Figure ATT-1 Ordinary colours for markings and externally illuminated signs and panels
Figure ATT-2  Colours of retroreflective materials for markings, signs and panels
Figure ATT-3  Colours of luminescent or transilluminated (internally illuminated) signs and panels