1. Objective

To advise of the available Overhead Aerial Markers, and their different applications.

In addition to the current overhead aerial markers, after trials, Energy Queensland is introducing the Rotamarka, supplied by Balmoral Engineering, as an alternate to the warning flags for aerial based, and some ground based, applications.

2. Introduction

2.1. Aerial based identification

Australian Standard AS 3891.2 Air navigation—Cables and their supporting structures—Marking and Safety requirements Part 2: Low level aviation operations, advises that a white marker is preferred to be used on conductors for aerial based identification. An orange marker should not be used for conductor identification for low level aviation unless specifically requested by an aviation operator.

AS 3891.2 Clause 2.2.2

2.2.2 Colour

The colour of aircraft warning markers shall be chosen for visibility and contrast with the surrounding background.

Markers referred to in this Standard shall be coloured with one, or a combination of, the colours listed in Table 1 in order of preference, commencing with white:

<table>
<thead>
<tr>
<th>Colour</th>
<th>Common name</th>
<th>AS 2700 Reference colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>White (preferred)</td>
<td>Off White</td>
<td>Y35</td>
</tr>
<tr>
<td>Yellow</td>
<td>Canary</td>
<td>Y11</td>
</tr>
<tr>
<td>Red</td>
<td>Signal Red</td>
<td>R15</td>
</tr>
<tr>
<td>Orange*</td>
<td>International Orange</td>
<td>R11</td>
</tr>
</tbody>
</table>

*Orange shall not be used except in circumstances requiring an unusual contrast.

NOTE 1. Orange is included above for the sake of continuity, to provide for aircraft warning markers installed prior to the issue of this Standard.
2.2. Ground based identification

An orange marker flag is to be used on conductors for ground based identification of a relatively temporary nature (6 months up to a few years depending on location). This includes for building and roadwork sites and the like.

Where a longer term solution is required, a different marker can be considered. This includes marking for agricultural applications or where existing marker flags have not provided the desired longevity.

3. Markers

3.1. Orange Flag Markers

For use in grounds based operations to provide a visual identification aid for overhead powerlines.

3.2. White Flag Markers

For use in aerial based operations to provide a visual identification aid for overhead powerlines for low flying aircraft.
3.3. Warning Markers for Large Birds

For use in areas where there are issues with bird strikes on the overhead conductors by large birds (eg Pelicans). These light weight Markers emit ultra violet light from the disc at centre to assist in deterring birds.

3.4. Large Marker Balls

For use in aerial based operations to provide a visual identification aid for overhead powerlines for low flying aircraft. Can also be used where ground based marking is required. (Eg for Birds or boats over waterways)

3.5. Red/White Spinning Markers (Rotamarka)

For use in aerial based operations to provide a visual identification aid for overhead powerlines for low flying aircraft. Can also be used where ground based marking is required.

Note: It is possible that the Rotamarka will stop spinning after a period of time, in which case it will become a static marker. It is still considered suitable for powerline marking and there is no intention to replace these markers if they stop spinning, unless there are site specific exceptional circumstances that warrant replacement.
4. Installation of the Aerial Markers.

4.1. Instructions and Limitations on Use of Aerial Markers

Install markers according to the relevant work practice. Prior to installation conduct a visual inspection on the span of the conductor, pole top and hardware. Consideration should also be given to holding slack span conductors during installation.

No aerial marking devices are to be applied to 7/.064 Cu conductors, or on any conductors that are significantly corroded.

| WARNING | Aerial Marking devices are not to be installed on 7/.064 Cu conductor, or any conductor showing signs of significant corrosion. |

4.2. Small Markers (Flags)

- The number of marker flags and spacing’s are to be as requested by the property owner or aerial operator. The drawing below details the technical limitations for a typical installation.
- Maximum of 4 flags per conductor per span
- Formation and spacing may vary but scoper must ensure conductor clashing is avoided

**ZIG ZAG FORMATION**

**PARALLEL FORMATION**

4.3. Large Markers

- The number of markers or aviation flags, locations and spacing’s are to be as requested by the property owner or aerial operator. The drawing below details the technical limitations for a typical installation.
- The number of marker balls or aviation flags per conductor is limited to two, so as not to exceed tension of 70% of the conductor Nominal Working Load at 15°C, 900 pa wind. For higher wind pressures refer to Lines Standards
- The reduction in ground clearance at 50°C will be typically less than 150mm. Refer to the Overhead Construction/Design Manuals for regulation ground clearances.
- If marker balls are used, they must be Dulmison Australia or equivalent 300mm diameter spheres. Part numbers for the Dulmison type are as detailed in table below.
- Marker balls are to have a maximum diameter of 300mm and maximum weight of 3 kg.
- Preferred colours are White for aerial operations or Orange for ground operations. Other colours can be used if requested by the owner/aerial operator.

![Diagram of marker ball spans]

- **4 SPACES 50m MAX.**
  - 3 Markers per span
  - Spans up to 200m.

- **5 SPACES 50m MAX.**
  - 4 Markers per span
  - Spans up to 250m.
  - Maximum 2 markers Per conductor

- **6 SPACES 50m MAX.**
  - 5 Markers per span
  - Spans up to 300m.
  - Maximum 2 markers Per conductor

- **7 SPACES 50m MAX.**
  - 6 Markers per span
  - Spans up to 350m.
  - Maximum 2 markers Per conductor
5. Application of the Rotamarka

**WARNING**

As per section 4.1, Aerial Marking devices are not to be installed on 7/.064 Cu conductor, or any conductor showing signs of significant corrosion.

The Rotamarka can be attached to the overhead conductors from either the ground or from a EWP using the appropriate attachment with either a link stick or shot-gun stick.

<table>
<thead>
<tr>
<th>DULMISON PART No.</th>
<th>SPHERE DIA.(mm)</th>
<th>CABLE RANGE (mm)</th>
<th>WEIGHT (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UFO 3060</td>
<td>300</td>
<td>6.00 - 7.99</td>
<td>3</td>
</tr>
<tr>
<td>UFO 3080</td>
<td>300</td>
<td>8.00 - 9.99</td>
<td>3</td>
</tr>
<tr>
<td>UFO 3100</td>
<td>300</td>
<td>10.00 - 11.99</td>
<td>3</td>
</tr>
<tr>
<td>UFO 3120</td>
<td>300</td>
<td>12.00 - 13.99</td>
<td>3</td>
</tr>
<tr>
<td>UFO 3140</td>
<td>300</td>
<td>14.00 - 15.99</td>
<td>3</td>
</tr>
<tr>
<td>UFO 3160</td>
<td>300</td>
<td>16.00 - 18.99</td>
<td>3</td>
</tr>
<tr>
<td>UFO 3190</td>
<td>300</td>
<td>19.00 - 22.99</td>
<td>3</td>
</tr>
<tr>
<td>UFO 3225</td>
<td>300</td>
<td>22.50 - 26.99</td>
<td>3</td>
</tr>
</tbody>
</table>
5.1. Ground based

5.2. EWP based
6. Stockcodes

<table>
<thead>
<tr>
<th>Item</th>
<th>Southeast (Energex) SC</th>
<th>North/South (Ergon) SC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange Marker Flag, for use in ground based operations</td>
<td>21702</td>
<td>2461523</td>
</tr>
<tr>
<td>White Marker Flag, for use in aerial based operations</td>
<td>21703</td>
<td>2422368</td>
</tr>
<tr>
<td>Warning Marker for Large Birds</td>
<td>16813</td>
<td>*</td>
</tr>
<tr>
<td>Marker Balls</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Red/White Spinning Marker, for use in aerial based operations</td>
<td>2466464</td>
<td>2466464</td>
</tr>
</tbody>
</table>

*Stockcodes are not available; these items are to be ordered directly from the supplier.

7. Obsolete Line Markers

7.1. Ronstan Aerial Line Marker

The Ronstan Aerial Line Marker (SC 2461416) has been made obsolete. It has been replaced by the marker balls and the Balmoral Rotamarka.

8. Quick Reference Matrix

<table>
<thead>
<tr>
<th>Marker Type</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ground</td>
</tr>
<tr>
<td>Orange Flag Markers</td>
<td>Preferred</td>
</tr>
<tr>
<td>White Flag Markers</td>
<td></td>
</tr>
<tr>
<td>Warning Markers for Large Birds</td>
<td>Approved</td>
</tr>
<tr>
<td>Large Marker Balls</td>
<td>Approved</td>
</tr>
<tr>
<td>Red/White Spinning Markers</td>
<td>Approved</td>
</tr>
</tbody>
</table>

Preferred: First choice for a particular warning marker application.

Approved: Marker can be used when the preferred option is deemed not suitable for that application.

9. Further Information

For further information, please contact

- Paul Relf, 07 3664 4797, email paulreelf@energex.com.au,
- Craig Avenell, 07 4931 2782, email Craig.Avenell@ergon.com.au, or
- Fabio Zaini, 07 3664 4441, email fabio.zaini@energyq.com.au

This Standards Alert will remain in force until either the expiry date is exceeded, or update of the relevant sections of the specified manuals has occurred.