Transport Canada Transports Canada

Advisory Circular

Subject: **CL-810 Mid-point Lights, Azimuth Intensity Distribution**

Issuing Office:	Civil Aviation, Standards	Document No.:	AC 601-004
File Classification No.:	Z 5000-34	Issue No.:	01
RDIMS No.:	14250222-v7	Effective Date:	2020-02-15

Table of contents

List of figures

1.0 Introduction

(1) This Advisory Circular (AC) is provided for information and guidance purposes. It describes an example of an acceptable means, but not the only means, of demonstrating compliance with regulations and standards. This AC on its own does not change, create, amend or permit deviations from regulatory requirements, nor does it establish minimum standards.

1.1 Purpose

(1) The purpose of this Advisory Circular (AC) is to provide a specification for the azimuth [horizontal] intensity distribution of specialized obstacle lights used for mid-point lighting of windturbines. These lights are installed from the inside, through the wall of the mast, and would not have a 360 degree distribution. However, these lights can be considered as meeting CL-810 in that individually they render a portion of the required 360 distribution.

1.2 Applicability

(1) This AC is applicable to manufacturers of obstacle lights, lighting designers and owners of wind turbines of more than 150 m in height. This AC is also available for information purposes to the aviation industry.

1.3 Description of changes

(1) Not applicable.

2.0 References and requirements

2.1 Reference documents

(1) It is intended that the following reference materials be used in conjunction with this document:

(a) Standard 621 - Obstruction Marking and Lighting.

2.2 Cancelled documents

(1) Not applicable.

2.3 Definitions and abbreviations

(1) The following **abbreviations** are used in this document:

(a) **cd:** candela

(b) **CL-810:** low intensity red light fixture identified in Standard 621.

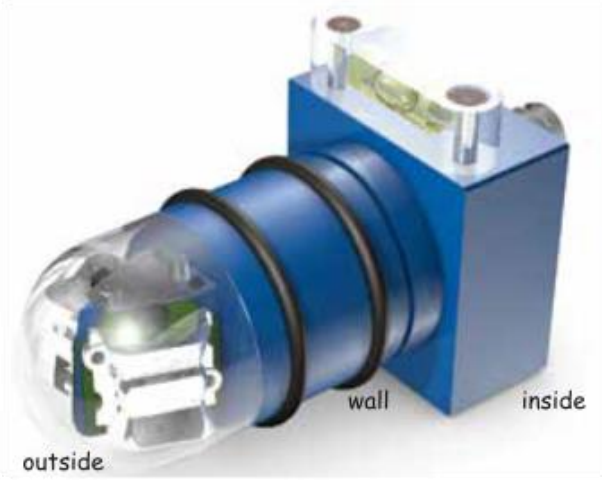
3.0 Background

(1) Standard 621 stipulates that, for windturbines of more than 150 m in height, at least three CL-810 light fixtures are installed around the mid-point level of the mast.

(2) The CL-810 requirement is for a 360 degree horizontal distribution. That is, omnidirectional output in azimuth. The output over this range, and 2.5 to 12.5 degrees vertical, is to be more than a minimum of 32 cd.

(3) As shown in Figure 1 below, these specialized lights are intended for installation from the inside, by means of a hole drilled in the wall of the mast. Obviously, it is impossible for such lights to have a 360 degree horizontal distribution.

Figure 1 – Through-the-wall light



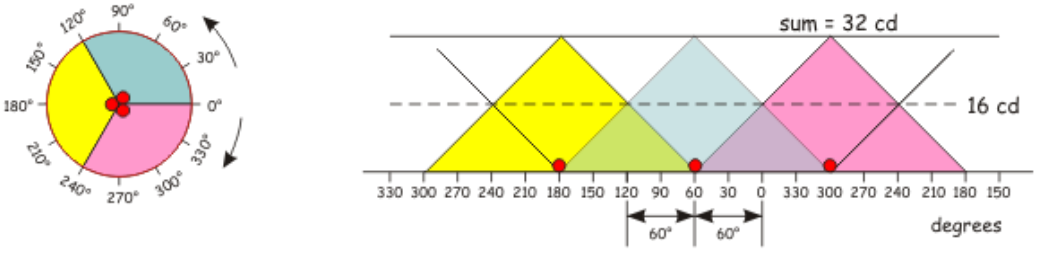
source: Quantec Networks

(4) Standard 621 specifies characteristics of the light signal as seen by the pilot. In as much as there are 3 lights equally spaced around the mid-point of the mast, each produces a portion of the 360 degree signal to the pilot.

4.0 Discussion

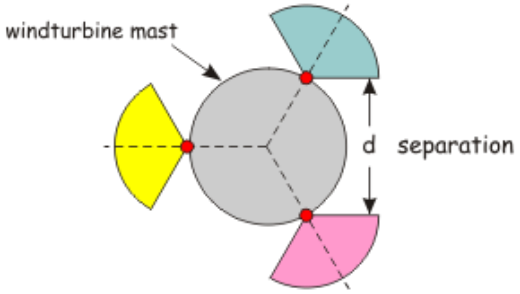
(1) If the light fixtures, as shown in Figure 2, are co-located [with no separation], the output at the edges of ±60 degrees for adjacent lights, can be added to meet the minimum requirement. Thus the measured output at the defined edges [± 60 degrees] of the light beam can be a minimum of 16 cd, such that 16 cd + 16 cd = 32 cd.

Figure 2 – Sum of emissions



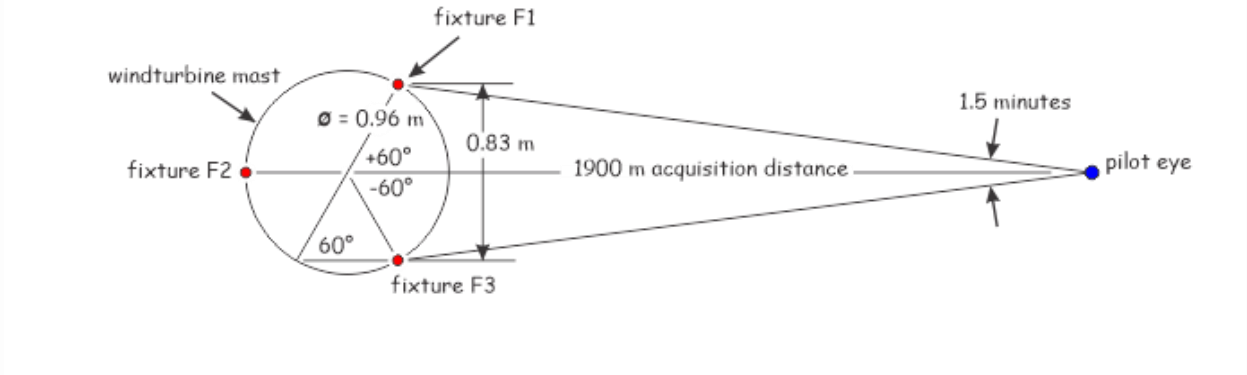
(2) If the lights are not co-located, as illustrated in Figure 3, the distance "d" can be such that the lights are resolved [seen separately] by the pilot eye. If resolved, the outputs at the edges cannot be added and therefore at least the 32 cd minimum is required at the edges of the light distribution of each fixture.

Figure 3 – Light separation



(3) Given an angle of resolution of 1.5 minutes of arc and an acquisition distance of 1900 m, as illustrated in Figure 4, the lights would be resolved when the distance of separation is greater than 0.83 m or a mast diameter of more than 0.96 m.

Figure 4 – Minimum separation distance



(4) In as much a typical windturbine mast has a diameter in excess of 0.96 m, it can be anticipated that the mid-point lights would always be resolved.

(5) Because fixtures installed through-the-wall of the mast may not be orientated precisely or may move after installation, a tolerance of ±10 degrees is applied.

5.0 Summary / Conclusion

(1) Through-the-wall light fixtures installed around the mid-point of the windturbine mast would be acceptable as meeting the specified requirements of CL-810, if the output at ±70 degrees horizontal and +2.5 to +12.5 degrees vertical is more than the minimum of 32 cd.

6.0 Information management

(1) Not applicable.

7.0 Document history

(1) Not applicable.

8.0 Contact us

For more information, please contact:

Flight Standards, AARTA
E-mail: TC.Flights.Standards-Normesdevol.TC@tc.gc.ca

We invite suggestions for amendment to this document. Submit your comments to:

Civil Aviation Communications Centre.
Telephone: 1-800-305-2059
E-mail: services@tc.gc.ca

Original signed by Robert Sincennes

Robert Sincennes
Director, Standards
Civil Aviation