Presentation to
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Transport Canada Transports Canada

Canada

Activity

- Completion of revised Standard 621
- Completion of Regulations 601.23 to 601.29
- Advisory circulars for aviation lighting
- Other work in progress

Regulations

The Canadian Aviation Regulations have a number coding

Part I - General Provisions
Part II - Aircraft Identification and Registration and Operation of a Leased Aircraft by a Non-registered Owner
Part III - Aerodromes, Airports and Heliports
Part IV - Personnel Licensing and Training
Part V - Airworthiness
Part VI - General Operating and Flight Rules
Part VII - Commercial Air Services
Part VIII - Air Navigation Services
Part IX - Repeals and Coming into Force

Part VI - General Operating and Flight Rules

Subpart 0 - Interpretation
Subpart 1 - Airspace
Subpart 2 - Operating and Flight Rules
Subpart 3 - Special Flight Operations
Subpart 4 - Private Operator Passenger Transportation
Subpart 5 - Aircraft Requirements
Subpart 6 - Miscellaneous

Thus 601 for Obstacle Marking and Lighting

The original regulation was 601.19.

601.19 Where it is likely that a building, structure or object, including an object of natural growth, is hazardous to aviation safety because of its height and location, the Minister **may,** by order, direct the owner, or other person in possession or control of the building, structure or object, to mark it and light it in accordance with the standards specified in the *Standards Obstruction Markings Manual*.

The above regulation put onus upon the Minister [Transport Canada] to direct the application of marking and lighting.

The new regulations give specific criteria for application so that the owner of the object will know what is required. The onus of responsibility is then placed upon the owner of the object to follow the standards.

The Regulations --- Canadian Aviation Regulations (CAR)

CAR601.23 - ***Obstacles to Air Navigation***

The basic criteria for when an object is an obstacle … penetration of an obstacle limitation surface … more than 90m near aerodromes and airways … more than 150m everywhere.

CAR601.24 - ***Marking and Lighting of Obstacles to Air Navigation***

The actual requirement to mark and light objects which are deemed to be obstacles

CAR601.25 - ***Other Obstacles to Air Navigation***

This regulation points out that other objects may be obstacles other than the basic criteria of CAR601.23.

CAR601.26 - ***Upgrading of Marking and Lighting***

This covers instances for which there is some change in surrounding conditions such that marking and lighting is to be upgraded [e.g. the loss of shielding]

CAR601.27 - ***Equivalent Marking and Lighting***

This regulation to enable innovation of equivalent means to mark and light. It also addresses cases such as normal lighting [e.g. Processing plant lighting] which may be used in place of standard marking and lighting.

CAR601.28 - ***Notification of Deterioration, Failure or Malfunction***

The requirement for NOTAM.

CAR601.29 - ***Prohibition***

A needed regulation to address vandalism.

Standard 621

Standard 621 is equivalent to the FAAs advisory circular AC 70/7460-1, except that the specification which is similar to the FAAs AC 150/5345-43 is included as Appendix B.

Standard 621

The Standard 621 for Obstacle Marking and Lighting was finally promulgated on 31 December 2011.

Standard 621 uses the auxiliary verb "shall". The previous version had the auxiliary verb "should" and was voluntary in context.

The light units are designated with the letter "C" to indicate a similarity with FAA as to application. However, the specified characteristics may differ. E.g. the characteristics of the CL-810 differ in photometrics from the FAA's L-810 although the intensity is still 32cd.

Table 4-1: Light Units

Type	Intensity	Colour	Signal	Flash Rate (fpm)
CL-810	Low	red	fixed	n/a
CL-864	Medium	red	flashing	20-40
CL-865	Medium	white	flashing	40
CL-866, Catenary	Medium	white	flashing	60
CL-885, Catenary	Medium	red	flashing	60
CL-856	High	white	flashing	40
CL-857, Catenary	High	white	flashing	60

Chapter 13 - Maintenance

The Chapter 13 is describes use the aviation orange colour tolerance chart

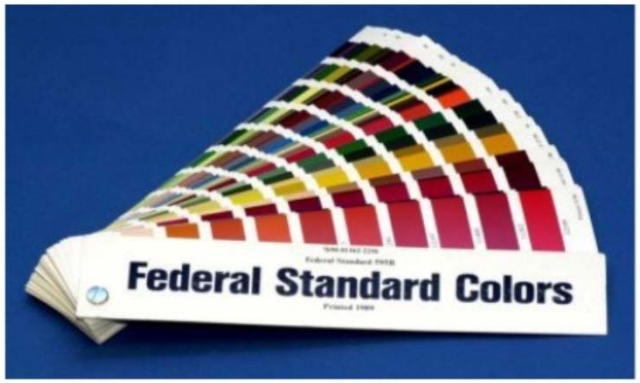
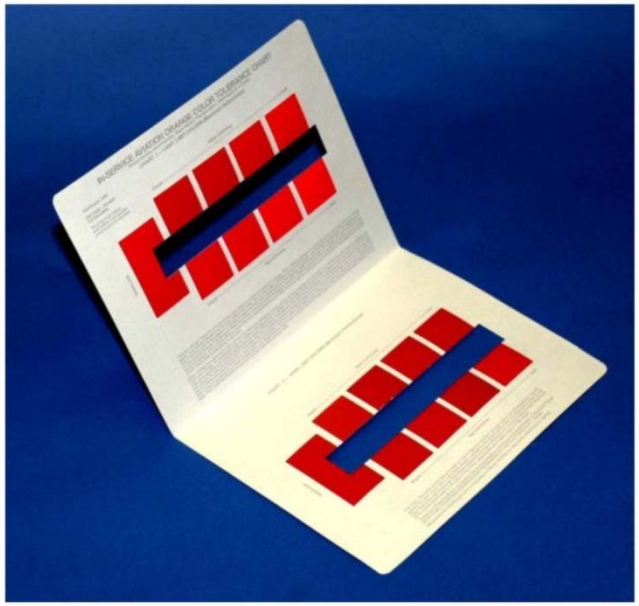


Figure 14-1: Colour Standard



Figured 14-2: Aviation Orange Colour Tolerance Chart

Chapter 15 Aircraft Detection System (ADS)

Requirements for a radar based system which detects aircraft and turns the lights on along with broadcast of an audio warning when within 30 seconds of a defined "impact boundary" around the obstacle. At least 5 catenaries in Canada now have ADS. So far one windfarm has been provided with the system.

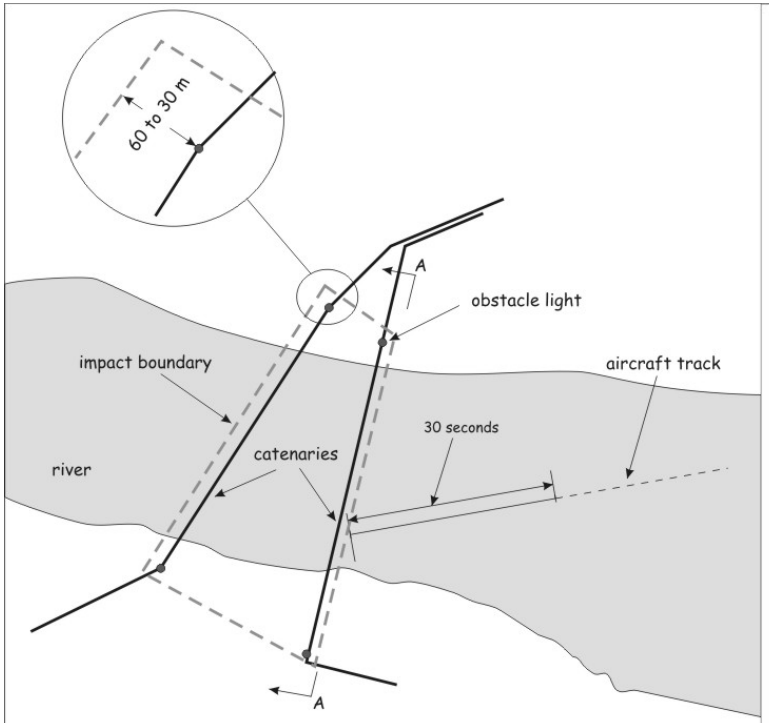


Figure 15-1: Catenary Crossing - plan view

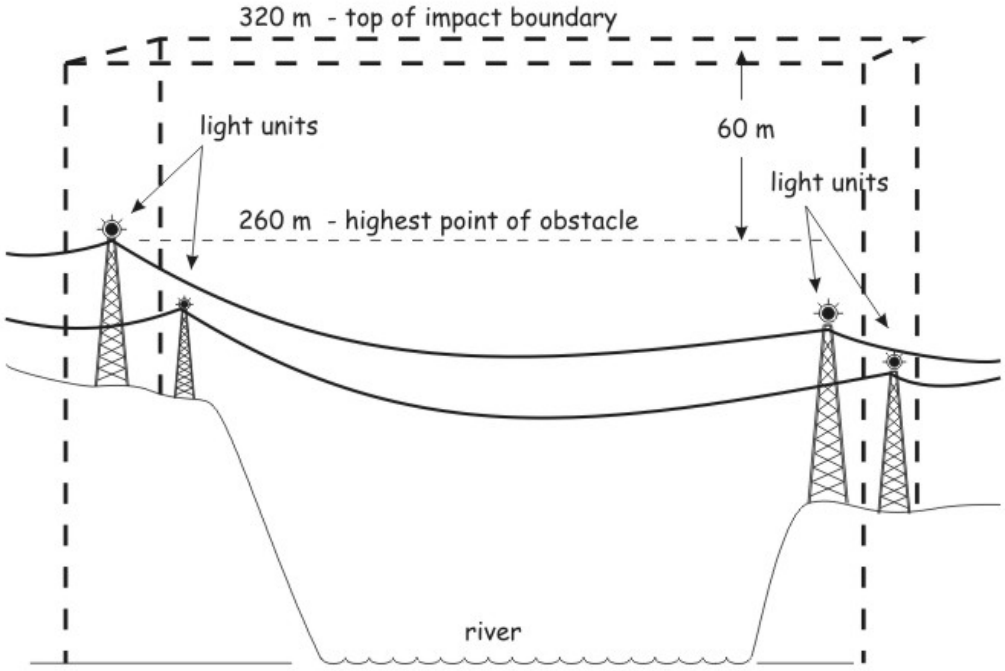


Figure 15-2: Catenary Crossing - profile view

Advisory Circulars

Transport Canada advisory circulars differ from that of FAA, in that they do not become mandatory with Federal funding. The content is only guidance material.

A listing of advisory circulars specific to Aviation Lighting is found on the Visual Aids webpage.

http://www.tc.gc.ca/eng/civilaviation/standards/aerodromeairnav-standards-visual-menu-926.htm

http://www.tc.gc.ca/eng/civilaviation/standards/aerodromeairnav-standards-visual-ac-3822.htm

Other work in progress

- Standards for lighting windturbines over 150m.
- Standards amendment for removal of CL-810 side lights on towers of more than 105m. The removal is to reduce bird fatalities.
- AC on Obstacle lighting. This to record the rationale for light intensities.
- AC on Obstacle marking. This to emphasize the need for maintenance of paint on towers and other objects that have day protection.

Work for ICAO

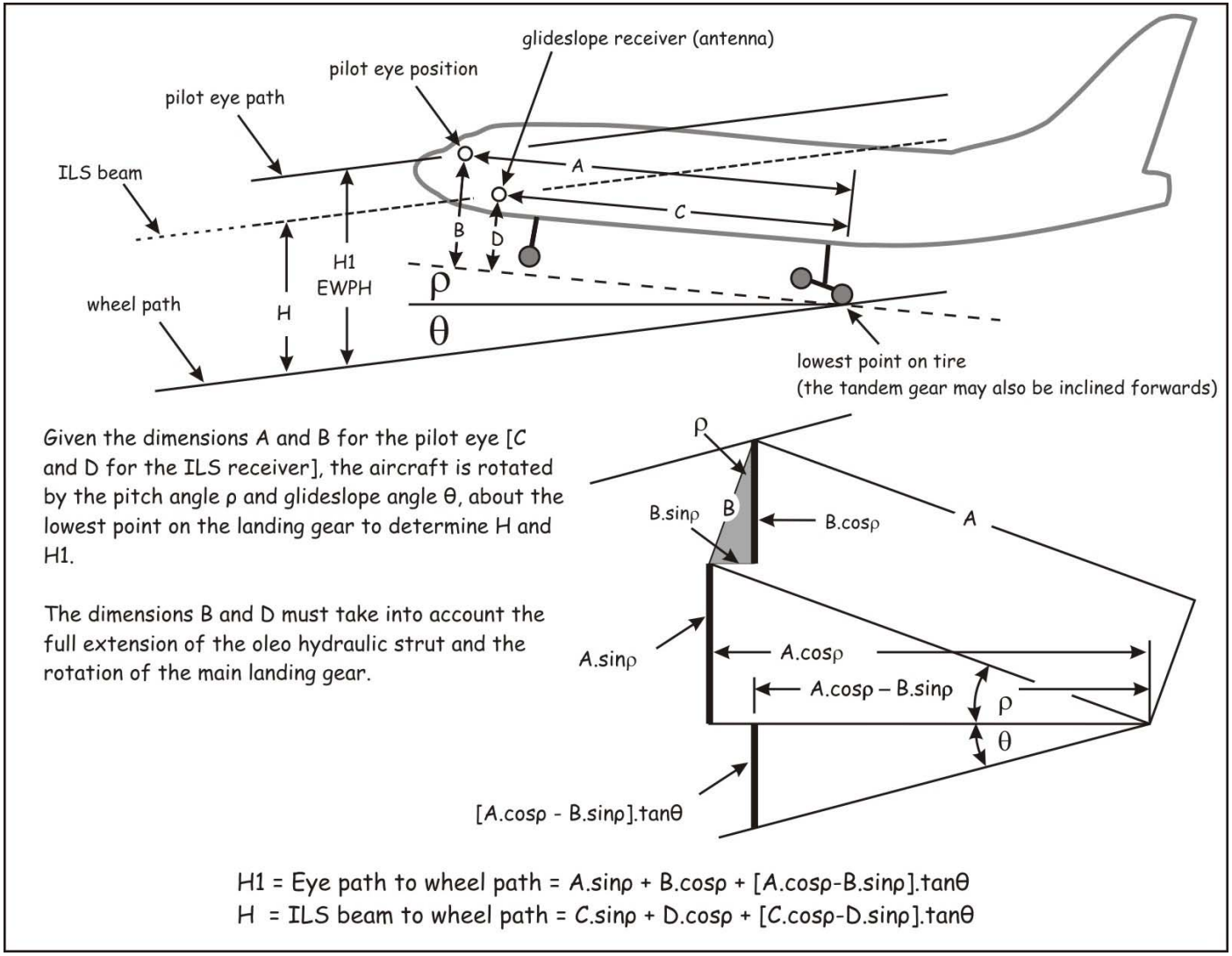
❑ Revision of ADM4, Appendix 6.

This work has essentially be completed. The intent is that the values of H [antenna to wheel height] and H1 [eye to wheel height] be reported on the aircraft manufacturers website.

The values H and H1 found from rotating the aircraft through the pitch angle and the glidepath angle.

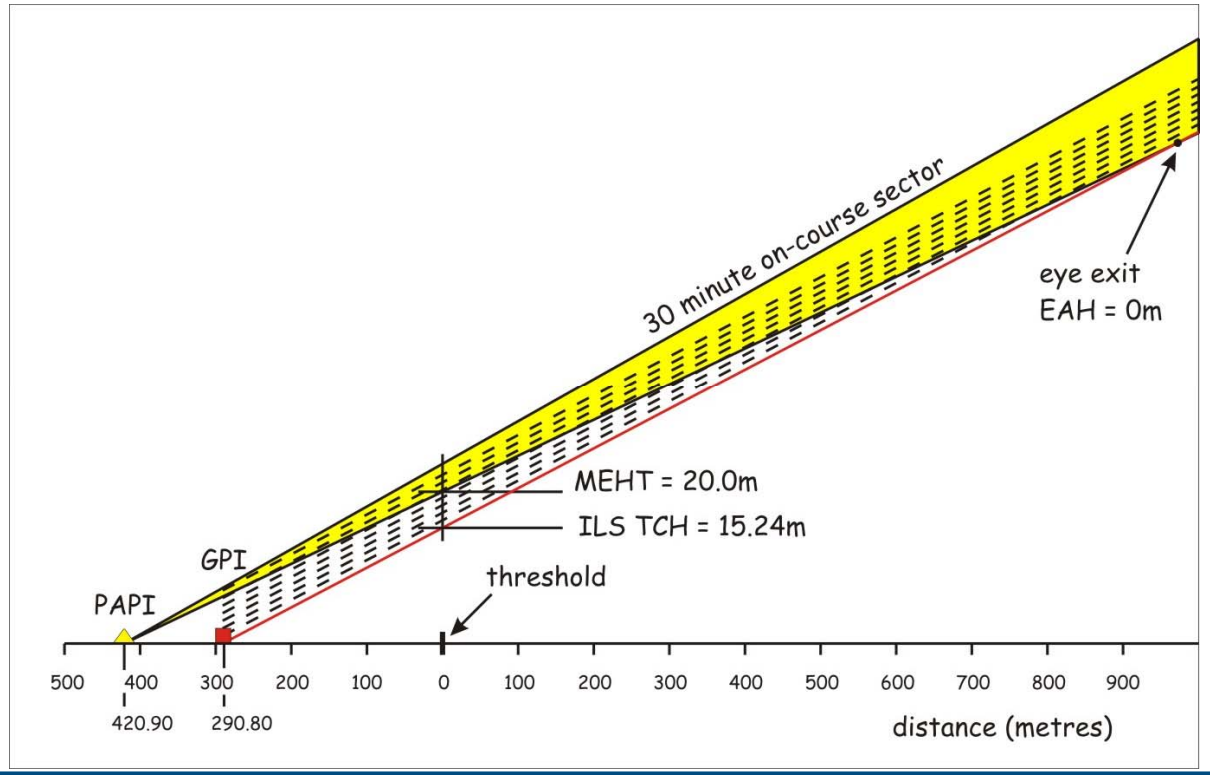
Example websites:

Airbus
Boeing


glideslope receiver (antenna)
pilot eye position
pilot eye path
ILS beam
A
C
B
D
H1
EWPH
H
ρ
θ
wheel path
lowest point on tire
(the tandem gear may also be inclined forwards)
Given the dimensions A and B for the pilot eye [C and D for the ILS receiver], the aircraft is rotated by the pitch angle ρ and glideslope angle θ, about the lowest point on the landing gear to determine H and H1.
The dimensions B and D must take into account the full extension of the oleo hydraulic strut and the rotation of the main landing gear.
ρ
B.sinρ
B
B.cosρ
A
A.sinρ
A.cosρ
A.cosρ – B.sinρ
ρ
θ
[A.cosρ - B.sinρ].tanθ
H1 = Eye path to wheel path = A.sinρ + B.cosρ + [A.cosρ-B.sinρ].tanθ
H = ILS beam to wheel path = C.sinρ + D.cosρ + [C.cosρ-D.sinρ].tanθ

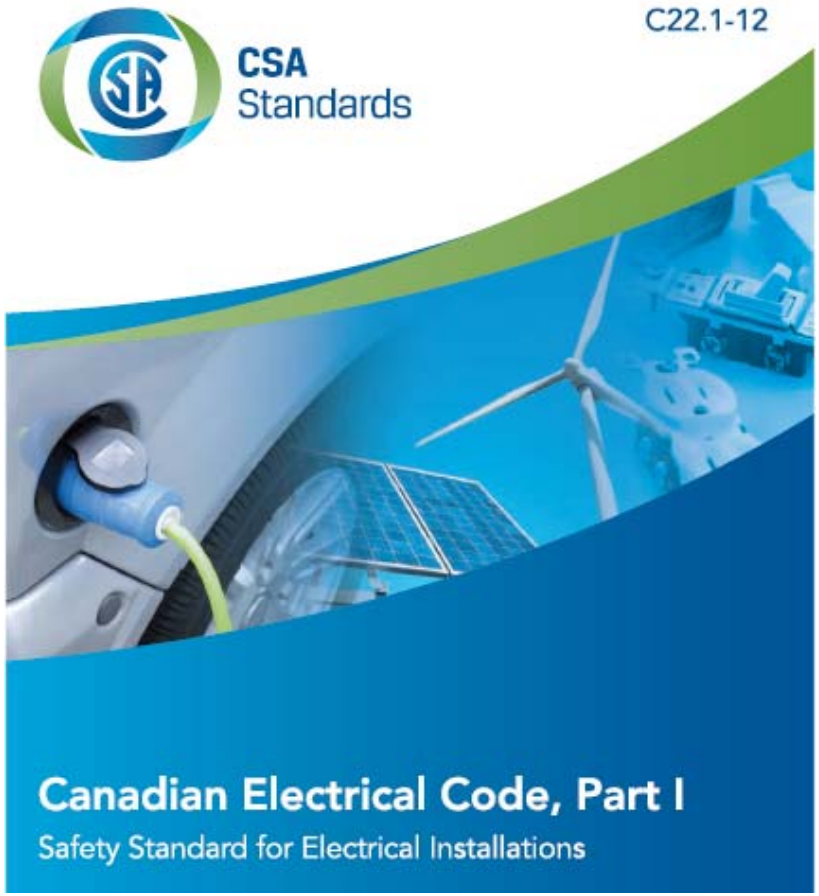
❑ Harmonization of PAPI with ILS.

Harmonization is a condition for which the PAPI on-course signal is coincident with the ILS beam and EAHs [eye to antenna heights] of the aircraft using the runway. At present, this harmonization is constrained by the need to provide a MEHT [minimum eye height over threshold].



Work for CSA

Outside of Transport Canada, work is being done to revise the Section 74 "Airport Installation. The major issue is that of grounding of the light units for lightning protection and personnel safety.



Section 74 — Airport installations

74-000 Scope

(1) This Section applies to the installation of series-type constant-current circuitry supplying airport visual aid systems.

(2) The requirements of this Section supplement or amend the general requirements of this Code.

74-002 Special terminology

In this Section, the following definitions apply:

Ground anchor — a post set into the ground and supporting the lighting fixture.

Ground counterpoise — a conductor installed over lighting cables for the purpose of interconnecting the system ground electrodes and providing lightning protection for the cables.

Pull pit — a below-grade junction box used as a cable pulling point, to house transformers or series lighting cable splices.

Series isolating transformer — a transformer used in airport series lighting circuits to maintain continuity of the primary circuit when the continuity of the secondary circuit is interrupted.

74-004 Wiring methods (see Appendix B)

(1) Series cables for 6.6 A systems shall be type ASLC and shall be installed in accordance with the requirements of Rule 12-012.

(2) For aircraft and vehicle visual aid systems on public areas of airports, or that extend beyond the airport property, the installation of buried cables shall be in accordance with the requirements of Rule 12-012.

(3) For installations covered by this Section of the Code, in areas not accessible to the public, single conductors and cable assemblies shall be of the type indicated in Table 19 as suitable for direct earth burial and shall be installed as follows:
- (a) when installed in a raceway, be no less than 450 mm deep;
- (b) when direct buried, be no less than 450 mm deep with a layer of sand or screened earth extending at least 75 mm above and below the conductors, if in rocky or stony ground; and
- (c) when installed under runways, taxiways, aprons, and roads, mechanical protection shall be provided in the form of rigid conduit or a system of concrete-encased underground raceways installed a minimum of 600 mm deep.

(4) When installed within a concrete or asphalt surface, Type ASLC shall be installed in a raceway.

(5) Series cables for 6.6 A systems directly buried in a trench shall have at least
- (a) 75 mm lateral separation between cables of different series circuits;
- (b) 300 mm lateral separation from low-voltage and control cables;
- (c) 75 mm vertical separation in crossovers on the same system; and
- (d) 300 mm vertical separation from low-voltage cables crossing over, with the low-voltage cables in the upper position.

(6) Each cable of a series circuit shall be identified with a cable marker indicating the circuit origin at each point

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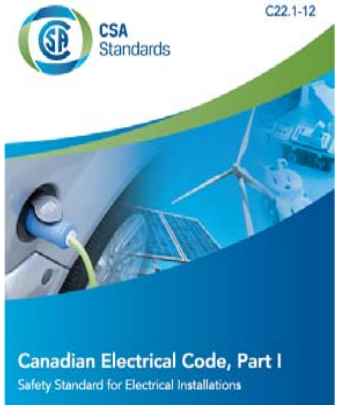
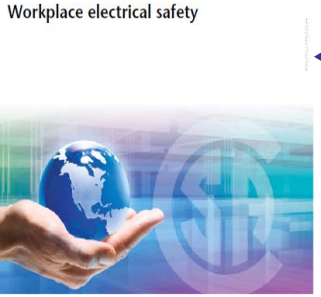
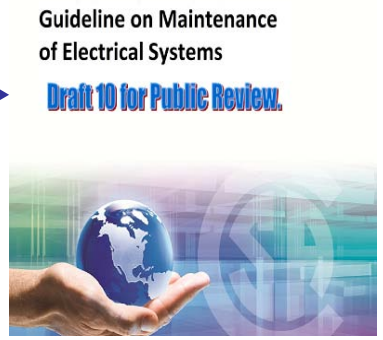
Outside of Transport Canada, work is being done to develop a CSA Guideline on Maintenance of Electrical Systems. It is intended that this guideline would also address maintenance of airport installations.



CSA C21.1 12
NFPA 70 + AC 150 5340-30 + 5370-10



Workplace electrical safety CSA –Z462
NFPA 70E



Guideline on Maintenance of Electrical Systems CSA Z-463
NFPA 70B Recommended Practice for Electrical Equipment Maintenance

Guideline on Maintenance of Electrical Systems CSA Z-463

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Table of content

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7 General Maintenance Practices

8 Equipment Specific Maintenance Practices

9 Specialized Equipment Maintenance

.19 Airport Lighting Systems

Out for public review

http://publicreview.csa.ca/Home/Details/392

Guideline on Maintenance of Electrical Systems CSA Z-463

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The airfield lighting systems covered in this document are:

1. Edge lighting (Airfield and Heliport)
2. Inset Lights
3. Precision Approach Path Indicator (PAPI)
4. Airside guidance signs
5. Sequence Flashing Approach Lights (SFAL)
6. Simple Approach Lighting System (ODALS)
7. Precision Approach Category 1 Lighting System (SSALR).
8. Precision Approach Category 2 Lighting System (ALSF-2).
9. Runway Identification Lights (RIL).
10. Wind cones.
11. Aeronautical Hazard Beacons & Obstruction lighting.
12. Aerodrome beacon.
13. Runway Guard Lights (RGL)
14. Constant Current Regulators
15. Series Circuit Selector Switches
16. Aircraft Radio Control of Aerodrome Lighting (ARCAL)

Guideline on Maintenance of Electrical Systems CSA Z-463

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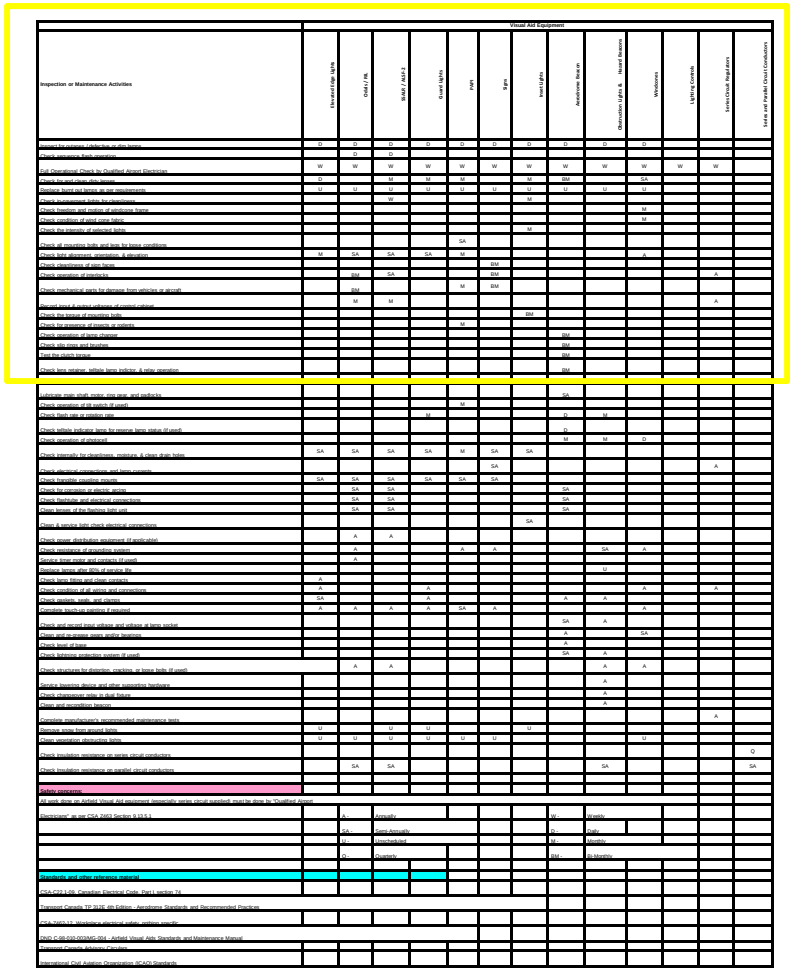

11. Tables

11.1. Airport Maintenance Activities

Inspection or Maintenance Activities	Visual Aid Equipment													
	Elevated Edge Lights	Odals / RIL	SSALR / ALSF-2	Guard Lights	PAPI	Signs	Inset Lights	Aerodrome Beacon	Obstruction Lights & Hazard Beacons	Windcones	Lighting Controls	Series Circuit Regulators	Series and Parallel Circuit Conductors
Inspect for outages / defective or dim lamps	D	D	D	D	D	D	D	D	D	D			
Check sequence flash operation		D	D										
Full Operational Check by Qualified Airport Electrician	W	W	W	W	W	W	W	W	W	W	W	W	
Check for and clean dirty lenses	D		M	M	M		M	BM		SA			
Replace burnt out lamps as per requirements	U	U	U	U	U	U	U	U	U	U			
Check in-pavement lights for cleanliness			W				M						
Check freedom and motion of windcone frame										M			
Check condition of wind cone fabric										M			
Check the intensity of selected lights							M						
Check all mounting bolts and legs for loose													

Question?

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RP37