



Transport  
Roads & Maritime  
Services

***ROADS AND MARITIME SERVICES***

***TRAFFIC SYSTEMS***

**SPECIFICATION NO. TSI-SP-063**

**FUNCTIONAL REQUIREMENTS FOR CONSPICUITY ENHANCEMENT SYSTEMS  
FOR STATIC SIGNS**

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**RECORD OF AMENDMENTS**

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1.0	First Issue	3/12/2015	ITS- PM
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## 1 SCOPE

This specification covers the functional requirements for Conspicuity Enhancement System (CES) for non-regulatory static signs. The CES is an optional upgrade to an existing or planned static sign.

Project requirements that differ from this specification will need to be specified separately by the project. The project can seek approval by submitting a TS202 application to the [ITS Helpdesk](#). This specification has optional requirements that the Project will have to specify to the Supplier.

Items excluded from the scope of this specification include:

- Sign post structure.
- Sign installation including retrofitting CES on the static sign.
- Conspicuity enhancement executed an annulus or flashing perimeter.
- Solar panel size if solar power is utilised.

## 2 GENERAL DESCRIPTION OF EQUIPMENT

A Conspicuity Enhancement System consists of the following:

- Conspicuity Device;
- Control Module;
- Power Source(s);
- Communication System; and
- Device or a method to remotely actuate CES.

Conspicuity devices will be purchased in pairs and operated to enhance the visibility of static signs to road users. Conspicuity devices may be applied to any size of static sign. The conspicuity devices may be operated by the user using a control device local and/or remote to the signs' location.

## 3 REFERENCES AND APPLICABLE DOCUMENTS

### 3.1 Australian Standard Specifications

- |     |                  |   |  |
|-----|------------------|---|--|
| [1] | AS 2144          | – | Traffic Signal Lanterns                                |
| [2] | AS 60529         | – | Degrees of protection provided by enclosures (IP Code) |
| [3] | AS 3000          | – | Wiring Rule  |
| [4] | AS/NZS 61000.6.1 | – | Electromagnetic compatibility (EMC)                    |

### 3.2 Roads and Maritime Services Documents

- |     |        |   |  |
|-----|--------|---|--|
| [5] | TS 201 | - | Approval of ITS Field Equipment        |
| [6] | TS 202 | - | Approval of ITS Solutions for Projects |

## 4 DEFINITIONS AND GLOSSARY OF TERMS

Cabling	This category includes cabling that is separate from modules such as inter-module cables, and wiring between other components, such as transformers
CES	Conspicuity Enhancement System
Conspicuity Device	One or more pairs of conspicuity lanterns
Control Module	The on-site system, controlling the Conspicuity Device, Communications System and Power Source

## 5 FUNCTIONAL REQUIREMENTS

### 5.1 Conspicuity Device

#### 5.1.1 Colour

The chromaticity coordinates of the light emitted by the conspicuity device shall fall within the yellow region defined in CIE 1931 chromaticity diagram. One such reference with the chromaticity diagram is Table 2.1 of AS 2144 [1].

#### 5.1.2 Conspicuity Device Size

Conspicuity device size shall have a diameter of at least 100mm and maximum of 220 mm.

#### 5.1.3 Luminous intensity

Each conspicuity device shall provide an undimmed luminous intensity of at least 420 candelas up to a maximum of 520 candelas.

The conspicuity device shall have a minimum luminous intensity half-angle of 10 degrees in left, right and downward direction.

The conspicuity device shall be provided with an open shroud/visor to protect against direct sunlight.

#### 5.1.4 Flash Cycle

The flash cycle of the conspicuity devices shall have a nominal cycle time of 1 second, and a duty cycle of 50%. The project may specify an alternative duty cycle for the flashing of the conspicuity devices.

#### 5.1.5 Conspicuity device location

Conspicuity devices may be located:

- above the top corners for one pair; OR
- above and below the corners for two pairs; OR
- to the side of the top corners for one pair; OR
- to the side of the top and bottom corners for two pairs.

The project may integrate the conspicuity devices within the static sign face however note the requirements in clause 5.4. The project will need to define whether the requirement is for one or two pairs and any specific requirements for device location.

### 5.2 Control Module

#### 5.2.1 Control Functions

The system shall:

- a) Control output flashing style (OFF, ON) when in receipt of a secure command;
- b) Blank the conspicuity devices under system failure; and
- c) Provide an appropriate level of security to hinder unauthorised activation of flashing.

The system shall have a method for remotely switching the CES ON/OFF.

Technology use is not limited to the following:

- (a) 'App' for a smart phone; or
- (b) Device having on/off switch to remotely control the CES; OR
- (c) Remote product host control system.

The control function may be performed locally using a remote or a remote interface that communicates with the control module.

### **5.2.2 Dimming**

A light sensor shall be used to sense the ambient light level in the vicinity of the static sign on which the conspicuity enhancement system is attached.

The luminous intensity of the conspicuity device shall be reduced to 50% (specified in Section 5.1.3) of the maximum brightness when the ambient light level measured by the light sensor falls below 30 Lux, and shall linearly increase to 100% brightness until the ambient light level measured by the light sensor rises above 150 Lux.

If light sensor is detected to be faulty or not connected then the conspicuity device shall output the 100% brightness.

### **5.2.3 Remote Monitoring**

If required, the project may specify a remote monitoring method for remote control, monitoring and/or System Alerts. The Supplier may offer a product host control system to RMS for remote monitoring. The requirements in this section are optional.

The remote monitoring shall be via the communication system specified in Section 5.6.

Fault data and System Alerts (defined in Section 5.2.4) shall be accessible within 1 minute on detection by the Control Module, or where necessary, immediately on recovery after system failure.

### **5.2.4 System Data Logging**

The Project may specify the level of system data logging required, if any. The requirements in this section are optional.

As general guidance the system may record the following events with timestamps that identify the following:

- b) Battery voltage falling below operational threshold;
- c) Battery voltage rising above operational threshold;
- d) Battery health status at a regular interval;
- e) Conspicuity failure;
- f) Recovery from conspicuity failure;
- g) Start of flashing;
- h) Stop flashing;

- i) External power source failure;
- j) Recovery from power source failure;
- k) Communications faults/failures;
- l) Faulty light sensor;
- m) Recovered from light sensor fault;
- n) Control module operational faults; and
- o) Recovery from the control module operational faults.

The Control module shall be capable of providing the logs to authorised personnel either locally or the remote monitoring system.

### **5.3 Environmental and Design requirements**

#### **5.3.1 Reliability and Design Life**

Equipment shall be designed to operate for a service life of 10 years and the battery for 5 years.

#### **5.3.2 Environmental Requirements**

The equipment shall be designed to operate under any combination of the following conditions:

- (a) Ambient air temperatures within the range of  $-15^{\circ}\text{C}$  and  $50^{\circ}\text{C}$ .
- (b) Insolation of up to  $1000\text{ W/m}^2$ , incident at an angle of  $30^{\circ}$  from the vertical, applied to the maximum exposed surface of the equipment.

NOTE: If testing is utilised to demonstrate this requirement and the required insolation cannot be delivered then it is acceptable to increase the ambient temperature limit by  $10^{\circ}\text{C}$  as a substitute.

Consideration shall be given to protection against the effects of high humidity, including condensation following a drop in ambient temperature.

#### **5.3.3 Electromagnetic Compatibility**

Electromagnetic compatibility shall meet requirements in AS/NZS 61000.6.1 and all relevant statutory requirements

### **5.4 Physical Requirements**

The mounting mechanism/s shall not create additional hazard or inhibit the visibility of the static sign.

The mounting requirements, weight, location of control module and power module shall be determined by the project.

The Conspicuity Device shall not inhibit the function or visibility of the static sign.

The Conspicuity Device shall provide visibility only for vehicles approaching the face of the static sign.

The sign shall be installed such to maintain its intended orientation and position when subjected to wind loading conditions that are applicable to region of sign installation, in accordance with AS/NZS 1170.2, Structural design actions Wind actions. The minimum wind-loading conditions applicable shall be for Region A, Terrain Category 2 in accordance with AS/NZS 1170.2.

#### **5.4.1 Control Housing**

The control housing Ingress Protection (IP) rating for weather resistance shall comply with the requirements in AS 60529 to provide IP45 for the complete control housing.

It is expected that the control housing will be mounted on the static sign.

The control housing size shall be less than the static sign and not visually obstruct the sign face.

#### **5.4.2 Cabling and Wiring**

All electrical wires, cables, connectors, terminals, and other electrical interconnecting facilities, shall comply with the requirements in AS 3000.

### **5.5 Power source(s)**

The sign may be powered by a mains connection or other power connections. Dependent on the type of the powered connection the relevant requirements will apply.

There shall be a readily available method to switch power OFF to the system by the maintainer.

#### **5.5.1 Mains Power Connection**

The operating voltages of any mains powered equipment shall comply with table 1 in AS 60038-2012.

Notwithstanding other requirements for the control housing, it is acceptable for the power supply module to be mounted in the same housing as the control module.

For mains power connection, the equipment shall provide surge protection to withstand the surges specified in AS/NZS 1768, Category B, with medium exposure peak amplitudes.

#### **5.5.2 Other power connections**

If other power connections like solar are utilised where they are not able to power the equipment constantly then a battery shall be charged by these sources to be available when required.

The power system and battery shall be appropriately designed to allow for the system to operate for a period of at least three (3) days without any power generation. The typical operation is anticipated to be as two (2) flashing cycles per day of 2 hour duration.

NOTE: If solar power is used then an appropriate sized solar panel should be used so as to support the operation of the sign.

It is expected that the power supply module (due to its volume, weight and complexity) may be housed separately from the control module.

The storage batteries shall use a type approved technology such as:

- (a) Deep-cycle, sealed gel batteries; or

- (b) Absorbed glass mat (AGM) batteries; or
- (c) Lithium iron phosphate (LiFePO<sub>4</sub>) batteries.

## 5.6 Communication System

The system shall provide communications between operator and control module.

The communications link technology used may include one or more of the following solutions:

- a) Licence-free radio bands;
- b) 3G wireless;
- c) 4G wireless;
- d) PSTN (Public switched telephone network) and
- e) Wi-Fi.

## 6 APPROVAL

Manufacturers and Suppliers seeking approval for their devices shall follow the process defined in TS201 [5].

Projects shall follow the process defined in TS202 [6] to seek project based approval for any devices that are not listed in TS200, ITS Register of Approved Equipment.

## 7 QUALITY ASSURANCE

The Supplier and the manufacturer shall operate a quality management system complying with ISO 9001.