MATERIAL SPECIFICATION FOR SIGNAL HEADS

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2461.01 SCOPE

This specification covers the requirements for traffic signal heads and associated components and accessories.

2461.02 REFERENCES

This specification refers to the following standards, specifications, or publications:

Ontario Ministry of Transportation Publications

Ontario Traffic Manual (OTM):
Book 12 - Traffic Signals

CSA Standards

C22.2 No. 0.4-17	Bonding of Electrical Equipment
C22.2 No. 127-15	Equipment and Lead Wires
S157-17	Strength Design in Aluminum

Institute of Transportation Engineers

ST-017B Equipment and Material Standards of the Institute of Transportation Engineers, April 3, 2006
ST-052 Vehicle Traffic Control Signal Heads: Light Emitting Diode (LED) Circular Signal Supplement, June 27, 2005
ST-054 Vehicle Traffic Control Signal Heads: Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement, January 1, 2008
ST-055 Pedestrian Traffic Control Signal Indicators: Light Emitting Diode (LED) Signal Modules, February 1, 2011

ASTM International

D4956-19 Retroreflective Sheeting for Traffic Control

Others

Federal Specification Colour Yellow 595B-33538
Federal Specification Colour Gray MVCL-14187
Ontario Highway Traffic Act, R.S.O. 1990, Chapter H.8

2461.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Backboard means a panel surrounding a signal head used for the purpose of increasing the attention value of the signal.

Chromaticity means the colour quality of light that is defined by the wavelength (hue) and saturation.

LED Lamp means a light emitting diode (LED) signal module, LED arrow signal module, or LED pedestrian signal module.

LED Arrow Signal Module means a signal unit comprised of an array of LEDs, lens, and related power supply that provides an arrow traffic signal indication.

LED Pedestrian Signal Module means a signal unit comprised of an array of LEDs, lens, and related power supply that provides a pedestrian signal indication consisting of a walking pedestrian or hand icon.

LED Signal Module means a signal unit comprised of any array of LEDs and related power supply and any required lenses that provides a circular traffic signal indication when connected to appropriate power.

Programmable Visibility Head means the traffic signal head that can be programmed to limit the visible area of the indication.

2461.04 DESIGN AND SUBMISSION REQUIREMENTS

2461.04.01 Design Requirements

2461.04.01.01 Signal Head Requirements

Signal heads shall be designed to be attached to the traffic signal hanger assemblies using cushion hangers, adjustable mid-section hangers, or dual-end hangers with standard 38 mm internal pipe size gusseted pipe and fittings. Structural design of aluminum shall be according to CSA S157.

2461.05 MATERIALS

2461.05.01 General

Signal heads, components, and accessories shall be according to ITE ST-017B and as specified in the Contract Documents.

2461.05.02 Signal Head Housings

Signal head housings shall be a die-cast aluminum or a moulded polycarbonate body with hinged door assembly to provide a water and dust tight enclosure. The openings of the signal head housing shall be provided with a removable sealing device. Aluminum alloy shall be according to CSA S157. The polycarbonate signal head shall be moulded, ultraviolet and heat stabilized, flame retardant resin, and shall be yellow according to Federal Specification Colour Yellow 595B-33538.

When specified in the Contract Documents, the colour of the signal head housing with grey body and the back of the aluminum or polycarbonate backboard shall be according to Federal Specification Colour Gray MVCL-14187.

Stainless steel reinforcing plates shall be provided according to the manufacturer's recommendation for the mounting arrangement as specified in the Contract Documents for the signal head.

2461.05.03 Visors

Each lens shall be provided with a removable visor of the cowl (cap) type. When specified in the Contract Documents, lenses shall be provided with removable visors of the tunnel, full-circle, or louvre type.

2461.05.04 Snow Shields

When specified in the Contract Documents, snow shields shall be provided and installed according to the manufacturer's recommendation. Snow shields shall be a one-piece injection molded unit, resistant to fading and discoloration with exposure to direct sunlight, and contain no electronic heaters or circuitry. The unit shall be entirely transparent and shall not degrade the LED photometric requirements in any way.

Each snow shield shall be provided with a new neoprene rubber gasket, and be compatible with all traffic module sizes listed in Table 1.

2461.05.05 Wiring

Wiring shall be #18 AWG stranded copper type TEW and according to CSA C22.2 No. 127.

2461.05.06 Ground Terminals

Ground lugs shall be provided in signal heads to accommodate a #14 AWG bonding wire.

2461.05.07 Backboards

As a minimum, backboards shall be fabricated from 1.00 mm thick aluminum sheets or 3.00 mm thick high-density polyethylene sheets and shall project a minimum of 125 mm all around beyond the signal head housing. The signal head backboard shall be standard colour yellow according to Federal Specification Colour Yellow 595B-33538.

All backboards shall be opaque, and shall be outfitted with a strip of 75 mm wide fluorescent yellow prismatic retroreflective sheeting according to ASTM D4956, Type XI, around the front facing border.

2461.05.08 Reflectors

Reflectors shall be Alzak aluminum and the reflective surface shall be according to ITE ST-017B.

2461.05.09 Lenses

Lenses shall be convex prismatic of the polycarbonate or glass type according to chromaticity characteristics specified in ITE ST-017B and with the size, type, colour, and orientation specified in the Contract Documents.

2461.05.10 Paint

Paint shall be synthetic resin enamel and according to Federal Standard Colour Yellow 595B-33538.

2461.05.11 LED Lamps

2461.05.11.01 Physical and Mechanical Requirements

The LED signal modules at minimum shall be according to ITE ST-052 and the Contract Documents.

The LED arrow signal modules at minimum shall be according to ITE ST-054 and the Contract Documents.

The LED pedestrian signal modules at minimum shall be according to ITE ST-055 and the Contract Documents.

Each LED lamp shall have a single lens with a smooth outer surface. All circular red lenses shall be tinted red and all circular amber lenses shall be tinted amber. The use of tinting or other materials to enhance ON/OFF contrasts shall not affect chromaticity and shall be uniform across the face of the lens. The lens shall be UV stabilized and shall be capable of withstanding direct ultraviolet sunlight exposure for a minimum period of 60 months without exhibiting evidence of deterioration or colour change.

All circular red, amber, and green LED lamps shall have an incandescent look that provides a softened and uniform appearance.

The LED lamps shall be capable of retrofitting and replacing incandescent lamps without modifications to a standard ITE traffic signal housing. Installation shall only require the removal of the existing lens, lamp reflector assembly, and gasket. Each LED lamp shall have secured jacketed and colour coded cables for connecting to power and for bonding to system ground. The connecting cable shall be rated 600 volts. All wire leads shall be one metre in length, pre-stripped, and tinned.

Each LED lamp shall be a sealed unit that includes all parts necessary for operation (e.g., printed circuit board, power supply, lens, and gasket) and shall be weatherproof after installation and connection. A one-piece 12.5 mm wide neoprene gasket shall be provided and installed on the LED lamp prior to delivery.

All LED lamps shall be according to the size, colour, and design specified in the Ontario Highway Traffic Act and the OTM Book 12.

The LED pedestrian signal module shall be the single unit with the walking pedestrian and hand superimposed in the same unit according to the Ontario Highway Traffic Act and the OTM Book 12.

All LED lamps shall be approved by the Electrical Safety Authority or by an organization accredited by the Standards Council of Canada.

The LED lamps for use in programmable visibility head shall comply with the general requirements for LED signal modules. The LED lamps shall be designed and constructed to be installed in a programmable visibility head without modification to the housing.

2461.05.11.02 Electrical Requirements

Electrical requirements for LED signal modules shall be according to ITE ST-052; the LED arrow signal modules shall be according to ITE ST-054; and the LED pedestrian signal modules shall be according to ITE ST-055.

Maximum power consumption for LED lamps shall be according to Table 1 and Table 2.

Power factor shall be a minimum of 0.95.

2461.05.11.03 Photometric Requirements

Photometric requirements of the LED signal modules shall be according to ITE ST-052. Photometric requirements of the LED arrow signal modules shall be according to ITE ST-054.

All LED signal and arrow signal modules shall be the expanded view type.

2461.05.11.04 LED Lamp Identification

Each LED lamp shall have the manufacturer's name, trademark, model number, serial number, and date of manufacture (i.e., month-year) marked on the back of the module.

The following operating characteristics shall be permanently marked on the back of the module: nominal operating voltage; power consumption, in watts; and volt-amperes.

Each LED lamp shall have a symbol of the type of module (e.g., circle or arrow) in the colour of the module marked on the back of the module. The colour of the module shall be written out next to the symbol.

When specific mounting orientation is required, each module shall have prominent and permanent marking consisting of an up arrow or the word UP or TOP.

2461.05.11.05 LED Lamp Warranty

The warranty period for each LED lamp shall be 60 months, commencing from the date of switch on for operation of the traffic signals in which the LED lamp is used. Any LED lamp deemed to have a visual or operational deficiency shall be replaced within 30 days. The warranty shall cover all delivery, parts, and material costs.

2461.07 PRODUCTION

2461.07.01 General

Sectional signal heads consisting of one to six sections shall be supplied as specified in the Contract Documents.

Lenses shall be arranged in the following order commencing from the top of the signal head to the bottom:

a) Red

b) Amber

c) Green

d) Straight Through Green Arrow

e) Left Turn Green / (Amber) Arrow

f) Right Turn Green Arrow

When any of the foregoing indications are not required, the order of arrangement shall be maintained by omitting those sections, which are not required.

Each section shall consist of a signal head housing, wiring, visor, LED lamps, reflectors, and lens, as specified in the Contract Documents.

Each complete assembly shall consist of a ground terminal and, when specified in the Contract Documents, a backboard.

Pedestrian signal heads shall consist of one or two housing sections suitable for rectangular signals. One display shall be a translucent lunar orange hand and the other display shall be a translucent lunar white walking pedestrian. Standard square visors shall be provided.

2461.07.02 Wiring

Loops of 150 mm length of wire shall be left in each section.

2461.07.03 Bonding

Metallic components shall be bonded together and grounded to the ground terminal according to CSA C22.2 No. 0.4.

2461.07.04 Assembly

All components shall be factory assembled using mechanical devices according to the strength requirements of ITE ST-017B.

2461.07.05 Painting

All externally visible portions or components of the metal signal heads, with the exception of lenses and the underside of visors, shall be painted yellow. The underside of the visors of the metal signal heads and the visors of the polycarbonate signal heads shall be painted matte black.

2461.07.06 Signal Head Identification

Each signal head shall have identification markings in a visible location indicating the manufacturer's name or trademark, date of manufacture, and standard designation OPSS 2461.

Identification markings shall be embossed on the signal head or on a corrosion-resistant metal plate securely attached to the signal head.

2461.07.07 Packaging

Each signal head shall be packaged securely in cardboard cartons. Backboards and separately ordered components may be packaged separately.

2461.08 QUALITY ASSURANCE

2461.08.01 Inspection

The Contract Administrator shall be notified a minimum of three Business Days prior to the start of fabrication for the signal heads.

While work is being performed, the Contract Administrator shall have access to the place of manufacture of the signal heads for the purpose of inspecting and examining plant records and certificates, materials used, process of manufacturing, and to make any tests as may be considered necessary.

All signal heads may be subject to an inspection by the Contract Administrator prior to shipment.

TABLE 1
LED Signal and Arrow Signal Modules
Maximum Power Consumption (Watts) based on Operating Temperatures (°C)

	Red		Amber		Green	
	25°C	74°C	25°C	74°C	25°C	74°C
Circular 300 mm	11	17	22	25	15	15
Circular 200 mm	8	13	13	16	12	12
300 mm Arrow	9	12	10	12	11	11
Programmable Visibility Indication	11	17	22	25	15	15

TABLE 2
LED Pedestrian Signal Modules
Maximum Power Consumption (Watts) based on Operating Temperatures (°C)

	25°C	74°C
Hand	10	12
Walking Pedestrian	9	12