

**STATE OF NEW JERSEY  
DEPARTMENT OF TRANSPORTATION  
TRENTON, NEW JERSEY 08625**

**METRIC SPECIFICATIONS FOR OPTICALLY PROGRAMMED ADJUSTABLE FACE  
VEHICLE TRAFFIC CONTROL SIGNAL HEADS**

N.J. Specification No. EBM-TS-2

Effective Date: July 1, 2001

New Jersey Department of Transportation Specifications for Optically Programmed Adjustable Face Vehicle Traffic Control Signal Heads.

The purpose of these specifications is to describe minimum acceptable design and operating requirements for Optically Programmed Vehicle Traffic Control Signal Heads.

**GENERAL - I**

- 1-1 Vehicle traffic control signal heads shall conform to the following:
- A. Manual on Uniform Traffic Control Devices (MUTCD)
  - B. Adjustable Face Vehicle Traffic Control Head Standard  
Institute of Transportation Engineers (ITE)
  - C. Standard Publication No. TS 1  
National Electrical Manufacturer's Association (NEMA)
- 1-2 The signal head shall permit visibility zone of the indication to be determined optically and require no hoods or louvers. The projected indication may be selectively visible or veiled anywhere within 15 degrees of the optical axis. No indication shall result from external illumination nor shall one indication illuminate a second indication.

**CONSTRUCTION - II**

- 2-1 Optically programmed traffic signal heads shall be a combination of signal faces of 300 millimeters signal sections with red, yellow, green or arrow lens as specified on the contract plans (or bid documents).
- 2-2 Die cast aluminum parts shall conform to ITE alloy and tensile requirements and have a chromate preparatory treatment. The exterior of the signal case, lamp housing and mounting flanges shall be finished with a high quality baked enamel prime and finish paint. The color shall be highway yellow conforming to FED-STD-595B color #13538. The lens holder and interior of the case shall be optical black.
- 2-3 The signal case and lens holder shall be pre-drilled for backplates and visors. Hinge and latch pins shall be stainless steel. All access openings shall be sealed with weather resistant rubber gaskets.

- 2-4 The components of the optical system shall comprise:
- A. Lamp
  - B. Lamp Collar
  - C. Optical Limiter - Diffuser
  - D. Objective Lens
- 2-5 The optical limiter shall provide an accessible imaging surface at focus on the optical axis for objects 270 meters to 360 meters distance and permit an effective veiling mask to be variously applied as determined by the desired visibility zone indicated on the contract plans. The optical limiter shall be provided with positive indexing means and heat resistant glass.
- 2-6 The objective lens shall be a high resolution annular incremental lens hermetically sealed within a flat laminate of weather resistant acrylic or approved equal. The lens shall be symmetrical in outline and may be rotated to any 90 degree orientation about the optical axis without displacing the primary image.
- 2-7 The optical system shall accommodate projection of any diverse, selected indicia to separate portions of the roadway such that only one indication will be simultaneously apparent to any viewer. The projected indication shall conform to the ITE transmittance and chromaticity standards.
- 2-8 The signal head shall mount to standard 41 millimeter pipe fittings as a single section, as a multi-section face or in combination with other signals. The single section shall be provided with an adjustable connection that permits incremental tilting from 0 to 10 degrees above and below the horizontal while maintaining a common vertical axis through couplers and mounting. Terminal connection shall permit external adjustment about the mounting axis in 5 degree increments. The signal shall be mounted with ordinary tools and capable of being serviced with ordinary tools.
- 2-9 All mounting fittings shall be specifically designed to function with the unit and will provide the proper clearance to aim and adjust the signal. All fittings and mounting hardware shall conform to details in the contract plans or, if not provided in the plans, as recommended by the manufacturer.
- 2-10 Attachments of the required visors, backplates or adapters shall conform and readily fasten to existing mounting surfaces without affecting water and light integrity of the signal.
- 2-11 Visors and backplates shall be aluminum.
- 2-12 All screws, washers, nuts and bolts shall be stainless steel.

### **ELECTRICAL - III**

- 3-1 Signal heads shall be rated for 120 volt, 60 hertz operation.
- 3-2 Lamp fixture shall comprise a separately accessible housing and integral lamp support, indexed ceramic socket and self-aligning, quick release lamp retainer. Electrical connection between case and lamp housing shall be accomplished with an interlock assembly which disconnects the lamp holder when opened. Each signal section shall include a covered terminal block for clip or screw attachment of lead wires. Concealed No. 18 AWG, stranded and coded wires shall interconnect all sections to permit field connection within any section. All field wires shall terminate on the terminal block with spade type connections.
- 3-3 The lamp shall be nominal 150 watt, 120 volt AC, three prong, seal beam having an integral reflector with stippled cover and an average rated life at least 6 000 hours. An equivalent 75 watt lamp shall be used with pedestrian indications and in certain distance limiting application if recommended by the manufacturer. The lamp shall be coupled to the diffusing element with a collar including a specular inner surface. The diffusing element may be discrete or integral with the convex surface of the optical limiter.
- 3-4 Each signal section shall include integral means for regulating its intensity between limits as a function of the individual background illumination. Lamp intensity shall not be less than 97 percent of the uncontrolled intensity at 10 764 lux and shall reduce to 15 percent  $\pm$  2 percent of the maximum at less than 10.7 lux. Response shall be proportional and essentially instantaneous to any detectable increase of illumination from darkness to 10 764 lux and damped for any decrease from 10 764 lux.
- 3-5 The intensity controller shall comprise an integrated, directional light sensing and regulating device interposed between the lamp and the line wires. It shall be compatible with 60 hertz input and responsive within the range of 105 to 135 volts output. It may be phase controlled, but the device shall provide a nominal terminal impedance of 1 200 ohms open circuit and a corresponding holding current.

#### **INSTRUCTIONS AND GUARANTEES - IV**

- 4-1 Upon request, one wiring diagram and installation manual shall be provided with each signal face.
- 4-2 No changes or substitutions in these requirements will be accepted unless authorized in writing. Inquiries regarding this specification shall be addressed to the Manager, Office of Traffic Signal and Safety Engineering, New Jersey Department of Transportation, 1035 Parkway Avenue, P.O. Box 613, Trenton, NJ 08625.
- 4-3 The signal head shall carry a one year guarantee from the date of delivery against any imperfections in workmanship and material.
- 4-4 The company agrees upon the request of the Manager, Office of Traffic Signal and Safety Engineering to deliver to the Office, a sample of the signal face to be supplied in compliance with these specifications for inspection and test before acceptance. After completion of the test, the sample shall be returned.