SECTION 16715

VEHICLE SIGNAL HEADS
(POLYCARBONATE)
(ADJUSTABLE, EXPANDABLE TYPE)

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Polycarbonate Vehicle Signal Heads with mounting attachments and light emitting diode (LED) lamp indications, louvered back plates, and Geometrically Programmed Louvers (GPL).

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. Payment for Vehicle Signal Heads will be measured by each vehicle signal head assembly required with specified mounting hardware. Vehicle Signal Heads shall consist of one (1) or more sections with visor(s), mounting hardware, LED indication color(s) specified and louvered back plates. The Vehicle Signal Head housings, doors and visors shall be Federal Highway Yellow.

2. Payment for Geometrically Programmed Louver (GPL) and adjustable full-circle visor will be measured as each unit required.

3. Payment for the work performed and materials furnished in accordance with this item will be paid for at the unit price bid for “Vehicle Signal Head”, of the various configurations complete with LED indication(s) and mounting hardware and louvered back plates as specified.

PART 2 PRODUCTS

2.01 MATERIALS

A. The traffic control signal heads shall be in accordance with the latest revision of ITE Technical Report No. 1.

B. Each traffic signal face shall consist of one or more signal sections rigidly fastened together as per manufacturer’s recommendations in such a manner as to present a continuous pleasing appearance.

C. The electric and optical system of the signal head shall, unless otherwise specified, be designed for operation from a power supply of 115 volt, single phase, 60 Hz alternating current and LED displays.

D. Polycarbonate shall be used in fabricating the vehicle signal heads described herein. Structural requirements for polycarbonate materials are described in Paragraphs. 2.02 and 2.03

E. All material for the mounting attachments shall be metal.

2.02 HOUSINGS

A. The polycarbonate vehicle signal head housing cases shall be a one-piece polycarbonate resin material with sides, top, and bottom integrally molded. The housing shall be injection molded from ultraviolet and heat stabilized flame retardant, permanently colored polycarbonate resins. The housing shall be a minimum of 0.125 inches (3.18 mm) thick measured anywhere on the housing, and shall be internally ribbed so as to produce the strongest possible assembly consistent with lightweight. The terminal block shall either be securely mounted or integrally molded into the housing.

B. Provision shall be made for accommodation of the particular type of mounting specified and attachment of doors, optical units, and other such accessories as may be specified for the particular installation. All traffic signal housing cases, together with doors, lenses, and mounting attachments, shall comprise a dust and moisture proof housing for the optical units, connecting wiring, and terminal block. The housing cases shall be of such construction as to assure permanent alignment of the lens in the traffic signal face. Design of door, housing, and visor shall be such that no light is visible in the profile view of the traffic signal face.

C. Vehicle Signal Head housing cases shall be of the sectional, adjustable, expandable type. The assembled housings for each signal face shall consist of three or more individual dual sections, each designed for housing a single complete optical unit. Individual signal sections shall be rigidly attached to form a single head either with at least four machine screws between each section or by the bolt-and-washer conduit method. Complete signal heads shall provide positive locked positioning when used with serrated brackets, mast arm, or span wire fittings.

D. Portions of cases providing for attachment to supporting arms shall be molded with large bosses for the supporting arms. Each housing case shall be so attached to its supporting arm that it will be adjustable by rotation about its vertical axis in such a manner that any pair of adjacent cases may be adjusted individually to give indications in two directions as close as 15 degrees apart and may be rigidly clamped in any position throughout the range of

adjustment. Provision shall be made for carrying the traffic signal leads enclosed in the mounting attachment.

E. Both the top and bottom of each traffic signal housing case shall be provided with an opening of two inches (50 mm) in diameter to accommodate 1-1/2" (38 mm) pipe brackets. A locking ring shall be integrally cast or molded around the bottom opening. Around the top opening shall be either an integrally cast or molded locking ring or a separate splined locking ring designed to fit into notches. The locking rings shall have a minimum of 72 evenly spaced teeth and shall be so designed that the top and bottom rings will mate to provide a perfectly aligned signal head with flush connection between the outer circumference of the sections.

F. Any open end of an assembled signal housing shall be plugged with an ornamental cap and gasket of an approved type.

2.03 HOUSING DOOR

A. The housing door of each traffic signal housing shall be a one one-piece polycarbonate resin material with an approximate 12-inch (300 mm) diameter circular opening for the lens as specified. The housing door shall be a minimum of 0.125 inches (3.18mm) thick measured anywhere on the housing door. The door shall be attached to the housing by means of two stainless steel hinge pins.

B. Two stainless steel wing screws shall be installed on the side of the door to provide for opening and closing the door without the use of special tools. Wing screws shall have a flat-bearing surface or stainless steel flat washer to prevent gouging of the housing door by the wing screws. Wing screws shall remain captive in the housing door when the door is open.

2.04 VISORS

A. Each traffic signal housing door shall be equipped with an easily detachable standard tunnel visor (unless requested otherwise). The visor shall be a polycarbonate resin to match the housing and door. The visor shall be rigidly attached to the door with rust-resistant connections in a manner that will prevent the leakage of light and moisture throughout the periphery of attachment.

B. Unless requested otherwise , the visor on the front of each door shall:

1. Be circular in section

2. Have a downward tilt of 2 to 8 degrees

3. Encompass approximately 300 degrees of the lens

4. Extend outward from the face of the lens a minimum of 9-1/2" (240 mm) for 12-inch (300 mm) diameter lens, (measured at its outer visible circumference)

5. Be of such design that the encircled portion of the lens will not be visible in the profile view of the traffic signal face

6. Be open at the bottom so as to prevent the accumulation of snow, dirt, and rain.

C. Visors shall be easily removed and replaced without damage to visor or signal head.

D. The four (4) tabs used to mount the visor to the signal shall be slotted. It shall not be necessary to completely remove the mounting screws to remove or replace the visor.

2.05 OPTICAL SYSTEM

A. The Vehicular Light Emitting Diode (LED) Indications to be furnished with the Vehicle Signal Head shall meet the requirements of Specification Section 16718, "Vehicular LED Indications".

2.06 TERMINAL BLOCKS AND ELECTRICAL

A. Terminal blocks shall be either two or seven position and be double row, with each section consisting of two 8-32 x 5/16-in. binding screws and a conducting metal strip between the screws.

B. The terminal blocks shall be a one-piece molded construction using phenolic materials, rated for a minimum 20 amps, 250 volt service

C. Each LED module shall be wired to a two position terminal block located in that signal section. A seven position terminal block shall be furnished in the outermost signal section of any 3 or more section vehicle signal head assembly. All sections of the vehicle signal head assembly shall be wired to the seven position terminal block. All terminal blocks shall be securely mounted in an accessible position and shall be of weatherproof-molded construction, equipped with identified terminals. Binding screws shall be provided for the field and interior wires.

D. Maintain throughout the vehicle signal head the color coding for wires from the LED Module to the main terminal block as shown below:

Indication	**Color Code**
Red Ball / Arrow	Red
Yellow Ball	Yellow

Green Ball	Green
Yellow Arrow	Yellow with Blue or White Tracer
Green Arrow	Green with Blue or White Tracer
Neutral	White

2.07 MOUNTING ATTACHMENTS

A. All mounting attachments shall be aluminum. Provision shall be made for carrying the signal leads enclosed in the mounting attachment. The mounting attachment, together with supporting arms and assembled housings, shall comprise a dust-and-moisture-proof enclosure for optical units and lead wiring. Mounting attachments shall be of one of the following types as specified for the particular vehicle signal head required.

1. Span-Wire Mounting. The span-wire mounting attachment shall consist of a cable clamp to receive a suspension cable of 3/8" (10 mm) diameter together with a suitable connection to the signal head. The mounting shall provide a "balance adjuster" between the signal head and span wire capable of permitting freedom of movement with reference to the point of suspension. The signal head shall be adjustable by rotation about its vertical axis in a horizontal plane and the mounting attachment shall be so constructed that the head may be firmly clamped in any position throughout the range of adjustment. The mounting shall provide a suitable outlet for wiring from the signal head tilted downward and so constructed as to effectively seal the interior of the head from dust and moisture and prevent undue abrasion of signal wiring. Mountings for signal head units not balanced at the point of support shall be provided with a suitable compensating device to insure that the signal head will assume a normally vertical position.

2. Mast-Arm Mounting. The mast-arm vehicle signal head mounting hardware shall be Astro-brac Tenon Mount bracket assembly, or approved equal.

3. Side-of-Pole Mounting. Supports for side-of-pole mounting of the signal head in a vertical position shall be 1-1/2" standard pipe bracket arms, attached to the top and bottom of the signal head with pipe nipples, serrated elbows and collared / cast nipples and band-on pole plates. Pole plates shall be provided with a cable guide. The mounting assembly shall consist of two standard pipe sections extending 12-3/4" from and at right angles to the axis of rotational adjustment of the signal head. Both supports shall have running threads at least 1-1/4" long at the pole connection end. The signal head shall be adjustable, by rotation of the various signal faces about their vertical axis, throughout a radial angle of 360 degrees and shall be capable of being rigidly clamped in any position through the range of adjustment. The wiring from the signal head shall be able to be enclosed in the top or bottom support.

2.08 LOUVERED VEHICLE SIGNAL HEAD BACK PLATE

A. The back plate shall be attached to all new vehicle signals. Back plate shall be continuously louvered around its perimeter.

B. Back plates shall be vacuum formed ABS plastic or aluminum.

C. Vacuum formed ABS plastic back plates shall contain ultraviolet inhibitors and stabilizers for protection against UV degradation.

D. The back plate shall extend around the periphery of the signal face a distance of five (5) inches for faces with twelve (12) inch lenses, and shall have a 3" corner radius.

E. ABS vacuum formed back plates shall be black and color consistent throughout the entire piece without varying shades and tones.

F. The louvers shall be evenly spaced around the back plate, including the top and bottom. The number of louvers adjacent to the vehicle signal head shall be nine (9) per signal section per side. Both the top and bottom back plate sections shall have nine (9) louvers each. The louvers shall be at least 3-1/2" long by 5/8" wide with an opening of at least ¼". The back plate shall be pre-drilled to fit the vehicle signal head for which it is designed.

G. ABS vacuum formed back plates shall have a minimum thickness of .125". All outside edges shall be formed with a ½" to 5/8" flange (inside dimension) turned away from the front surface. The back plate shall have a haircell finish on the front side and smooth finish on the back side.

H. Aluminum back plates shall be fabricated from anodized sheet aluminum and be painted dull black.

I. Stainless steel hardware for attaching the back plate to the vehicle signal head shall be provided.

2.09 GEOMETRICALLY PROGRAMMED LOUVER (GPL)

A. The louver shall have the following capabilities:

1. Fit all manufacturers' 12" vehicle signal heads.
2. Retrofit into existing 12" vehicle signal heads.
3. Provide a full round ball display, with minimum slat effect, throughout the selected view range.
4. Provide an absolute exact visual cut-off.
5. Allow the view angle within each signal section to be adjusted to a designated area.

6. Have minimum glow outside the view range.
7. Allow for controlling either the horizontal or vertical view range within the signal visor.

B. The louver housing shall consist of a two-piece assembly injection molded from black UV inhibited ABS plastic. Two (2) brass inserts shall be molded into the bottom half allowing the assembly to be fastened together with two (2) stainless steel screws.

C. The louver housing O.D. shall be 11-1/2" and have spherical contour which allows the light beam from the signal section to be directed up to 10-degrees in all directions from the centerline of the visor/lens system.

D. The inside surface shall have a multiplicity of grooves for positioning light directing baffles. The remaining inside surface shall be grooved to prevent surface reflections of light.

E. Two (2) sponge neoprene O-rings shall be positioned in grooves on the outside surface to prevent light leakage between the housing and the visor.

F. The louver housing design shall allow the baffle positions to be changed in order to adjust the view angle.

G. The baffles shall be molded from flat black, 10% glass filled UV inhibited virgin polycarbonate.

H. Each baffle shall be thin opaque disc with a multiple of parallel evenly spaced apertures (openings). Each structural member forming the aperture shall have a cross section which allows for good stiffness and structural integrity, but shall have a thin edge to prevent reflection (glow) outside the desired viewing range.

I. All baffles shall be identical in design and interchangeable within the housing. The plane of each baffle shall be 90-degrees to the centerline axis of the housing.

J. The louver shall be supplied with the necessary self-threading screw hardware to attach the louver to the vehicle signal head visor.

K. The louver shall include an installation kit that includes installation instructions, adjustment tool, visor marking template, and all incidentals necessary for attachment and positioning of the louver.

END OF SECTION