

LED (Light Emitting Diode) Blank Out Signs



1.0 Scope & Background

1.1 This document provides an overview of the technical requirements incorporated by Traffic Signs, Inc. to manufacture safe and reliable signage for use in traffic control.

1.2 LED signs designed and manufactured by Traffic Signs, Inc. are far more reliable than traditionally illuminated signs and require little or no maintenance. LED signs generally use only a small fraction of the power required by earlier generation signs and, are more economical to operate.

LEDs are “solid-state” devices because they are made of semi-conductor material held in a solid form that does not move and are virtually insensitive to movement or vibration of the component. This property, along with wire wrapped connections, helps make our LED signs extremely durable.

2.0 General

2.1 The LED sign shall be capable of displaying the message(s) when energized and be effectively blank when not energized. Signs are available for various MUTCD messages as well as custom messages as required.

3.0 Mechanical

3.1 The sign shall be constructed using weatherproof aluminum housings with outside dimensions 2 7/8” wider and taller than the specified face dimension. The housing shall consist of an 8” deep, .125” thick, extruded aluminum body, and a .063” aluminum back. All corners are TIG (Tungsten Inert Gas) welded to provide a weatherproof seal around the entire housing.

3.2 The door shall be constructed of .125” thick extruded aluminum. Two corners are TIG welded with the other two screwed together to make one side of the door removable for installation of the faceplate and 1/8” nominal polycarbonate lens. The door is fastened to the housing on the left (or bottom) by a full length, .040” x 1 1/4” open

stainless steel hinge. The door shall be held secure onto a 5/32" thick neoprene gasket by stainless steel quarter-turn link locks.

3.3 A three-sided visor made of .063" aluminum shall be fitted to the door to act as a sunshade and improve the visibility of the message.

3.4 All surfaces of the sign shall be etched and primed in accordance to industry standards before receiving two color coats of industrial enamel. Powder Coat, anodize or mill finishes are also available.

3.5 The perimeter of the polycarbonate lens and the inside of the .063 aluminum back shall be sealed by a continuous bead of silicone caulk to prevent moisture intrusion inside the sign.

3.6 All fasteners and hardware shall be corrosion resistant stainless steel. No tools are required for routine maintenance.

4.0 Electrical – Wiring/Control

4.1 Field wires shall carry the control voltage of 120 VAC into the sign and connect to a barrier type terminal block. All terminals shall be clearly marked as to their function.

4.2 A one-amp rated fuse shall be mounted in the primary 120 VAC power line for each power supply.

5.0 Electrical - Power Supply

5.1 A class 2 power supply shall convert 120VAC to 48VDC. The power supply shall be IP67 or better and have a load current rating of 1.2 amperes. Typically, two identical power supplies will be incorporated into each sign. Each supply is capable of handling the full load independently. This provides redundancy and thereby increases reliability of the system.

5.2 Power to LEDs will be delivered through a custom Printed Circuit Board (PCB). The PCB shall be capable of allowing two power supplies to be properly paralleled using diode isolation between positive terminals of the supplies.

5.3 PCB substrate material shall be 0.062" thick G-10 glass laminate of FR-4 grade and comply with UL-94VO flame-retardant specification. The PCB shall limit LED current. Precision current adjustment is incorporated in the PCB to facilitate matching current between different colored strings of series wired LEDs and shall be preset by factory technicians. Connection of the LED series wired strings shall be made by a minimum of five wire wrap turns around a 0.025" square wire wrap pin for maximum reliability.

6.0 LEDs

6.1 All LEDs will be mounted so as to protrude through the faceplate between 0.123 and 0.133 Inches. Mounting clips shall secure the LEDs to the faceplate. The clips shall be a one-piece configuration of black plastic. The LED mounting clip shall have the LED inserted into it and securely align and hold the LED in position perpendicular to the faceplate. Apparent spacing between LEDs shall be uniform. Spacing may vary slightly when measured numerically to compensate for crossing over of two or more messages and for optimal appearance of all symbols. Sign message shall look as symmetrical and attractive as possible.

6.2 LEDs will be wired in series strings of appropriate length depending upon color and forward voltage of the LEDs being used in the string. Because of potential failure from vibration, all connections shall be wire wrapped with a minimum of five turns per MIL-specification, section 217. A four-corner wrap post with five windings of the conductor wire results in 20 paralleled contact zones, thus 20 times the contact as a solder point. This means that the entire contact surface is greater than the cross-section of the wire itself to ensure a secure and permanent connection under all conditions traffic control devices are normally subjected to. All wrap connections shall be made using #26AWG Kynar insulated wire wrap type wire.

6.3 After final testing the entire back side of the LED assembly including PCBs shall be coated with Silicone Conformal Coating. This process gives the completed assembly a protective barrier against moisture and potential corrosion for extended life. Installation of the protective back cover is the last operation prior to the assembly being installed in the sign.

7.0 Environmental

7.1 Operating and storage temperature range shall -40°F to $+165^{\circ}\text{F}$. Operating and storage humidity range shall be 10 to 90% non-condensing. To maintain the product warranty, stored signs must be carefully and properly stored indoors and in an upright position.

8.0 Electromagnetic Compatibility

8.1 System shall meet FCC part 15-A for radio interference and conducted line noise.

9.0 Reliability

9.1 The LED sign unit utilizes LEDs with 100,000 hour rated life. This assumes no physical damage from external sources such as mechanical impact, fire, lightning strike, etc.