

Oregon Department of Transportation

Trailer-Mounted Portable Variable Message Sign (PVMS) Specifications for Qualified Products List (QPL)

1. General

These specifications describe the minimum requirements for a trailer-mounted portable variable message sign which is to be used on a state highway to display warning and advisory messages for traffic control.

Requirements are given for each component of the portable variable message sign assembly: sign display, charge controller, power system, battery cabinet, and trailer.

2. MUTCD Compliance

The sign assembly shall meet all applicable federal and state standards and the requirements stated in the *Manual for Uniform Traffic Control Devices (MUTCD 2000)* including the following:

- 2.1 The mounting of the sign shall be such that the bottom of the message panel is a minimum of 2.15 m (7 ft) above the roadway when it is in the operating mode.
- 2.2 The sign shall automatically adjust its brightness under varying light conditions, to maintain legibility.
- 2.3 The sign controller shall include a display screen upon which messages can be reviewed before being displayed on the message sign.
- 2.4 The sign controller shall be capable of maintaining memory when power is unavailable.
- 2.5 The sign shall be equipped with a power source and a battery back-up to provide continuous operation when failure of the primary power source occurs.

3. Environmental Requirements

- 3.1 The sign shall be designed to operate within the following temperature range: -20 to 140 degrees F.
- 3.2 The sign shall be designed to operate within the following humidity range: 20 to 95% non-condensing.

3.3 The sign must be adequately ventilated to minimize fogging.

4. Sign Display Requirements

4.1 Display Technology

- 4.1.1 The sign shall use InGaAlP Light Emitting Diodes (LED) only or hybrid LED-flip disks. Other display technologies such as lamp matrix, shuttered fiber, flip disk, etc. are not allowed.
- 4.1.2 A minimum of three LEDs per pixel shall be provided for LED only signs. A minimum of two LEDs per pixel shall be provided for hybrid LED-flip disk signs.
- 4.1.3 LEDs shall be amber in color and 590 nanometers (nominal) wavelength.
- 4.1.4 The failure of a single LED within a pixel shall not impact the functionality of any pixel.
- 4.1.4 Reflective material used in hybrid LED-flip disk signs shall be designed in such a way to prevent peeling, warping, fading, etc.
- 4.1.5 Hybrid LED-flip disks shall be designed to prevent pixel sticking for ease of maintenance and continuous operation.
- 4.1.6 The brightness of the LED shall be controlled by pulse width modulation of DC current with an adjustable duty cycle. LED drive current shall not exceed the LED manufacturer's recommendations.

4.2 Characters

- 4.2.1 The display may be a line matrix, a character matrix, or a full matrix capable of displaying eight (8) characters per line. Each character shall be defined by a 5 X 7 matrix.
- 4.2.2 The sign shall be capable of displaying all upper case alphanumeric characters.
- 4.2.3 The sign shall be capable of displaying three (3) lines of characters. The character height shall be 18 inches.

4.3 Message Display

- 4.3.1 The sign shall be visible from 800 m (1/2 mile) under both day and night conditions.
- 4.3.2 A text message using single-stroked characters shall be legible from a minimum distance of 200 m (650 ft) during both day and nighttime operation.
- 4.3.3 The sign shall be capable of storing at least 50 programmable messages.
- 4.3.4 The time it takes to alternate between panels shall be no more than 0.25 seconds.
- 4.3.5 Message changes shall be accomplished with no horizontal scrolling, flashing, or other visual disturbance.
- 4.3.6 The message shall be legible at viewing angles up to 11 degrees from center.
- 4.3.7 The sign controller shall use a keypad or keyboard for creating messages. The controller shall use password authorization to prevent unauthorized operation.

4.4 Design Features

- 4.4.1 The sign shall come with an electro-hydraulic raise/lowering mechanism. A manual back up system shall also be provided. The sign shall be able to be securely locked either in the transport or display height position.
- 4.4.2 The sign shall be able to rotate up to 360 degrees and securely lock in any position.
- 4.4.3 The sign shall have a high impact resistant, clear, non-glare, UV inhibited polycarbonate or equivalent face.

5. Charge Controller and Battery Cabinet Requirements

- 5.1 The batteries, charge controller, and sign controller shall be housed in a lockable, weatherproof cabinet to prevent the access by unauthorized personnel.

- 5.2 The cabinet should include an ID plate showing the manufacturer's name, model number, and serial number of all components of the sign assembly.
- 5.3 The cabinet shall be painted with lead free orange paint.

6.0 Power System Requirements

- 6.1 The sign shall use photovoltaic (solar) panels for power. The user shall be able to adjust the panels to minimize wind drag during transport and for maximizing exposure during use.
- 6.2 The sign shall use a solid state charge controller to regulate the charging and discharging of the battery and photovoltaic panels. The sign shall be able to accept power from conventional 120V AC, 60 Hz for recharging purposes. Upon low voltage condition the charge controller shall disconnect the battery for protection. The charge controller shall reconnect the batteries when sufficient voltage is provided. The charge controller shall provide short circuit and overcharge protection.
- 6.3 The sign shall use 12V DC deep cycle lead acid batteries. All batteries shall be safely secured within the battery enclosure. The batteries shall be able to operate the sign continuously for at least 20 days without recharging.

7.0 Trailer Requirements

- 7.1 The Gross Vehicle Weight (GVW) rating of the trailer shall be sufficient to accommodate the weight of the sign assembly.
- 7.2 The trailer shall be provided with two safety chains of 3/8-inch high-test steel with safety grab hooks.
- 7.3 The trailer shall be equipped with four crank down 2000-pound (minimum) capacity jacks for leveling and stabilizing the sign when in operation. The sign shall be stable during operation in winds up to 80 miles per hour.
- 7.4 The trailer and lighting shall comply with the requirements of the Federal Motor Vehicle Safety Standards (FMVSS) and the State of Oregon Motor Vehicle Code. A license plate light and holder shall be provided.
- 7.5 The trailer shall be painted with lead free orange paint.
- 7.6 Advertising is not allowed on the trailer or sign assembly except for the standard markings normally found on a unit.