

Recommended Design Criteria and Functional/Operating Guidelines for a Color-Light Signal, Doublet-Lens Type
Revised 2023 (3 Pages)

A. Purpose

1. This Manual Part recommends design criteria and functional/operating guidelines for color-light signal units of the doublet lens type
2. Signal units for long range with 8-3/8 in (213 mm) diameter lenses and also for short range and dwarf signals with 6-3/8 in (162 mm) diameter lenses are covered by these recommendations.

B. Additional Recommendations for More Information on Design Material

See Manual Part 7.5.1 Identical Items "Boilerplate" for all Manual Parts in Section 7, Sections C and D.

C. Signal Case and Light Units

1. Assembly of light units to signal head for long range shall be so designed that the projected light beams from all units in one signal case will be parallel to each other.
2. Signal head for long range signals should be provided with means for use of a sighting device accurately aligned parallel to the projected light beams.
3. Means should be provided on long range signals for the addition of special wide angle deflecting prism roundels to improve visibility of signal on curves.
4. Signal may display one or more colors arranged in a vertical, horizontal or triangular assembly.
5. Proper outlets should be provided for cable or wire entering the signal head or signal head and pole with provisions made for sealing.
 - a. Wire entrance in signal head shall have edges rounded and be readily accessible for sealing.
 - b. Conduit shall be equipped with means for making a good weatherproof mechanical connection to mast and signal head.
6. Means should be provided for the addition of a device for suppression of phantom aspects.

7. Transformers shall conform to Manual Part 14.2.10 Recommended Design Criteria for Transformer, Dry Type, Air Cooled. They shall be suitably mounted in the signal and may be provided with taps to properly adjust lamp voltage.
8. Resistors should be adjustable and shall conform to Manual Part 14.2.15 Recommended Design Criteria for Resistors. They shall be suitably mounted in the signal.
9. Light Units shall be of such design and construction so as to avoid undesirable reflection of external light.

D. Backgrounds and Hoods

1. Backgrounds shall be provided on all wayside signals except in tunnel applications or on dwarf signals.
2. For circular backgrounds on single unit signals, the outer edge of the background shall extend a minimum of 10 in (254 mm) from the center of the lens unit.
3. For multi-unit signal backgrounds, the outer edges of the background shall extend a minimum of 12 in (305 mm) from the center of any lens unit.
4. Hoods shall be provided on all wayside signals. Hood lengths shall be not less than 10 in (254 mm) for long range signals, 7 in (178 mm) for short range signals, or 4 in (102 mm) for dwarf signals.

E. Lenses and Roundels

Lenses shall be of the doublet type, outer lens clear, 8-3/8 in (213 mm) diameter for long range; 6-3/8 in (162 mm) diameter for short range and dwarf signals. Inner lens is colored as required, 5-1/2 in (140 mm) diameter. The focal length of the lens combination should be 1/2 in (12.7 mm).

F. Back Lights

1. Back lights may be provided.
2. Back lights shall be of such design as not to affect the aspect of the signal.

G. Mounting

1. Mounting may be either top-of-mast or bracket type, bolted to the mast.
2. Mounting of long-range signal heads should be adjustable, with means provided to establish easily and accurately an independent horizontal and vertical adjustment for alignment of the projected beam.

H. Terminals

Terminals should be so located as to be easily accessible.

I. Binding Posts

1. Binding posts, nuts, and washers shall conform to Manual Part 14.1.11 Recommended Design Criteria for Binding Posts, Nuts & Washers, Details & Assemblies.
2. Binding posts shall conform to Manual Part 14.1.12 Recommended Design Criteria for Standard Binding Posts.
3. Binding posts shall be mounted so they cannot be turned in the base of frame to which applied. They shall be properly insulated from each other and other metallic parts.
4. Terminal Blocks and Connectors shall conform to Manual Part 14.1.2 Recommended Design Criteria and Functional/Operating Guidelines for Solderless Screw-clamp or Screwless Cage-Clamp Terminal Blocks Used in Wiring Signal Apparatus with Copper Wire Only.

J. Dielectric Requirements

1. See Manual Part 11.5.1 Recommended Environmental Requirements for Electrical and Electronic Railroad Signal System Equipment, Class B.
2. Lamp receptacle shall withstand for one minute an insulation test of 800 volts ac.
3. A surface leakage distance of not less than 1/4 in (6.35 mm) shall be provided between any exposed metallic part of the apparatus carrying current and any other metallic part hereof.

K. Painting

See Manual Part 7.5.1 Identical Items "Boilerplate" for all Manual Parts in Section 7, Section L.