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Standard Practice for Viewing Conditions for Visual Inspection of Membrane Switches¹

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1. Scope

1.1 This practice covers procedures for performing visual inspection of membrane switches. This includes visual inspection of overlays and circuitry.

1.2 This practice defines lighting parameters, distance from eye to specimen, viewing angle, and the viewing time allowed for a specific size specimen.

1.3 This practice is only designed for visual inspection of aesthetic qualities of membrane switches. It is not intended for color matching or gloss measurement.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Terminology

2.1 Definitions:

2.1.1 *aesthetic qualities*—these relate to the cosmetic appearance of the membrane switch and include such characteristics as printing quality, uniformity of finish, material attributes, and mechanical integrity.

2.1.1.1 *Discussion*—These are often described by such terms as scratches, bubbles, dents, dings, bumps, blurs, smears, voids, pinholes, etc. These are highly subjective terms that defy precise definition but which are nonetheless identifiable and measurable.

2.1.2 *color matching*—procedure by which a color is compared to a standard to determine if the two are visually indistinguishable under specified lighting conditions.

¹ This practice is under the jurisdiction of ASTM Committee F01 on Electronics and is the direct responsibility of Subcommittee F01.18 on Printed Electronics.

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2.1.3 *continuous scanning motion*—viewing technique whereby the inspector views the whole specimen, in the time allowed, without stopping in any one area of the panel.

2.1.4 *cosmetic flaws (or defects)*— see *aesthetic qualities*.

2.1.5 *foot-candles*—unit of illuminance equal to one lumen per square foot.

2.1.6 *membrane switch*—a momentary switching device in which at least one contact is on, or made of, a flexible substrate.

2.1.7 *overlay*—outer layer of a membrane switch on which the graphics are printed.

2.1.7.1 *Discussion*—Not all membrane switches have an overlay.

2.1.8 *viewing angle*—the angle between the line of sight of the observer and the surface of the specimen.

2.1.9 *window areas*—any area of a membrane switch through which a display, light, lamp, or other graphics, are viewed.

3. Significance and Use

3.1 This practice is designed to enable all manufacturers and users of membrane switches to perform visual inspections under uniform conditions. The aim is to eliminate key variables in the inspection procedures so specimens can be viewed more objectively.

3.2 Viewing specimens under these conditions could reveal cosmetic defects in the specimen. Many of these defects or flaws are due to variables in the raw materials or the manufacturing process. These cosmetic flaws or defects do not necessarily mean that the specimen is defective. The determination of whether a specimen is acceptable or defective varies with the application and the needs of the user. Therefore, customer and vendor must agree on acceptable quality standards prior to manufacturing.

3.3 This practice does not establish standards for acceptability of specimens, only how they must be viewed (inspected).

3.4 This practice is not intended to be used for color matching purposes. Color matching must be performed under more precise lighting conditions outside the scope of this practice.

4. Procedure

4.1 Specimen shall be clean and dry.

4.2 Specimen shall be viewed by a person with normal vision (1× power) or corrected to normal vision (1× power).

4.2.1 Corrective lenses must be un-tinted. Do not use non-prescription or magnifying devices.

4.3 Lighting source shall be cool white fluorescent tubes producing 75 to 100 foot-candles at any point on the specimen.

4.4 The inspection area shall have a neutral gray background. Take care to keep the viewing area free from distractions.

4.5 View the specimen no closer than 18 in. from eye to surface of the specimen.

4.6 The viewing angle shall be perpendicular (plus or minus 15°) to the surface of the specimen.

4.7 View the specimen in a continuous scanning motion to ensure that the whole specimen is inspected.

4.8 The maximum viewing time is dependent on the size of the specimen (see **Table 1**).

TABLE 1 Specimen Size and Maximum Viewing Time

Specimen Size, in. ²	Maximum Viewing Time, s
Up to 12	3
13 to 20	6
21 to 30	9
31 to 40	12
41 to 50	15
51 to 60	18
over 60	3 s for each additional 10 in. ²

4.9 View window areas against a diffused lighted background at an intensity of 75 to 100 foot-candles on the surface of the specimen. Include the viewing time for window areas in the viewing time for the whole specimen.

5. Keywords

5.1 continuous scanning motion; footcandles; membrane switches; overlays; window areas

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