

Purpose:A simple method with the ANG test pattern to evaluate the angular performance of medical-grade liquid-crystal display (LCD) monitors was proposed by the International Electrotechnical Commission (IEC) in December 2009 (IEC 62563-1). The purpose of this study was to investigate correlation between the results obtained by using the ANG test pattern and the angular performance measured by a luminance meter. We also examined the effect of ambient-light conditions on the results evaluated by using the ANG test pattern.

Methods:Three LCDs, a medical-grade monochrome LCD (Radiforce GS220, 500 cd/m², Eizo Nanao), a medical-grade color LCD (Radiforce RX211, 300 cd/m², Eizo Nanao), and a general-purpose LCD (SyncMaster940B, 180 cd/m², Samsung) were used in this study. The ANG test pattern was observed by eight observers under three ambient-light conditions (0, 35, and 327 lux). Two different scoring methods were used. One is the method proposed by the IEC 62563-1, and the other is the method modified for comparison of results measured by a luminance meter. The luminance performance was measured as a function of viewing angle, and evaluated as the relative contrast ratio. Finally, the results in terms of the modified scores were compared to the luminance performance in various viewing angles.

Results:Variations of the modified scores and the relative contrast ratio as a function of viewing angle indicated a similar tendency for medical-grade LCDs. On the other hand, the two results did not correspond well for the general-purpose LCD. The difference between the results obtained at 0 and 327 lux was 0.11 at a maximum for all LCDs used in this study.

Conclusions:The evaluation method with the ANG test pattern is considered to be useful for evaluation of the angular performance for medical-grade LCDs taking ambient-light conditions into consideration.