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COLOR OF ILLUMINANT AND EFFICIENCY OF THE WORKER

This bureau has not carried on any research connecting color of illuminant with efficiency of the worker. It is believed that the connection is not very important, not nearly as important as the amount and angular distribution of the light.

The following rules for efficient lighting are given by Cady and Dates (Illuminating Engineering, Wiley, New York, pp. 354-402; 1928). Minimize glare, hang lights high up out of the field of vision, get plenty of steady and well, but not perfectly, diffused light (5 to 25 foot-candles), avoid flickering light, sharp shadows, and any very light or very dark regions in the room. Walls should reflect 30-50 per cent of the incident light; preferred colors, light warm gray, light buff, dark cream, light olive green; ceilings should reflect more than 65 per cent; preferred colors, white and light cream. Upper part of walls may be made lighter than lower; ceiling color may be extended down the walls somewhat. Desk tops should reflect not more than 25 per cent. Edges of steps should contrast with background as seen from above.

The color of the illuminant of the workshop has some effect, however, on the efficiency with which work may be conducted. The following bibliography serves not only to indicate the most important sources of information on this effect but also to give a brief summary of the several conclusions.

M. Luckiesh, Color and Its Applications, Van Nostrand, New York, p. 135; 1915. For discrimination of fine detail spectrum yellow light is best.

C. E. Ferree and G. Rand, The Effect of Visual Angle, Intensity, and Composition of Light on Important Ocular Functions, Transactions Illuminating Engineering Society, vol. 17, pp. 69-102; 1922. Speed of discrimination and acuity are best for white light, poorest for blue. The order is: white (artificial daylight), pale yellow (gas-filled incandescent lamp), spectrum yellow, spectrum yellow-green, medium reddish-yellow (incandescent lamp at voltage considerably under rating), spectrum orange, spectrum green, spectrum red, spectrum blue-green, spectrum blue. These results may be accounted for by two opposing principles: (1) light of highly saturated color is not favorable; (2) spectrum light is favorable because the retinal image is free from chromatic aberration. Power to sustain acuity is similar to the above except that spectrum green is inferior to spectrum red.

C. E. Ferree and G. Rand, Further Studies on the Effect of Composition of Light on Important Ocular Functions, Transactions Illuminating Engineering Society, vol. 19, pp. 424-455; 1924. Yellow light is less fatiguing and more comfortable for reading than red, blue or green light, saturation and brightness being equalized. White light is still better.

M. Luckiesh and F. K. Moss, The Effect on Visual Acuity of Shortening the Spectrum at the Blue End, Journal Optical Society of America and Review Scientific Instruments, vol. 10, pp. 275-281; 1925. Acuity is slightly increased by using a yellow filter (potassium dichromate) over an incandescent lamp in spite of the decreased brightness. This accounts for some of the advantages of yellow glasses for the eyes.

C. E. Ferree and G. Rand, The Effect of Mixing Artificial Light with Daylight on Important Functions of the Eye, Transactions Illuminating Engineering Society, vol. 21, pp. 588-612; 1926. The undesirable results of mixing incandescent-lamp light with diminishing daylight in the late afternoon are not due to the color of the mixture, but to a lag in adapting to the lower brightness. In order to minimize this lag, lights should be turned on before daylight is noticeably diminished.

F. E. Carlson, Relative Value of Daylight, Tungsten Filament, and Mercury Arc Light, and Mixtures as Measured by Visual Acuity, Transactions Illuminating Engineering Society, vol. 21, pp. 613-640; 1926. The acuity differences are not great, but daylight is generally the best.

I. G. Priest, Note on the Relative Comfort in Reading by Artificial Daylight and Unmodified Gas-filled Tungsten Lamps, Journal Optical Society of America and Review Scientific Instruments, vol. 15, pp. 131-136; 1927. For one observer artificial daylight proved highly satisfactory and incandescent-lamp light of the same intensity unacceptable.

K. Y. Tang, Visual Performance under Daylight, Incandescent, Mercury Vapor, and Their Mixtures, Transactions Illuminating Engineering Society, vol. 26, pp. 258-274; 1931. Daylight is definitely best, mercury-vapor light second, and incandescent-lamp light a good third.