

Visual strain of the underground train driver

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Abstract

The present study focuses on the visual strain of the underground railway train driver. The train lines and the lighting conditions, the driver's activity and complaints were studied. Results showed great differences in illumination and luminance between the tunnel and the stations along the tunnel. The lighting values change very frequently and quickly from dark to light and from light to dark. The visual acuity, retinal adaptation are permanently strained. Technical, organisational, personal protection and medical preventive interventions are necessary.

Method

In large cities the underground plays an important role in public transport. The underground runs only or predominantly underground and as a result, the lighting conditions under which the engine driver has to work and secure safety of passengers may be unfavourable. In the present study, the train lines, and the driver's tasks were analysed, and the lighting conditions in the driver's cabin, the tunnel and at stations (including light sources, illumination, and brightness) were assessed. The frequency at which lighting changes was timed, and the driver's subjective reports were collected. Tunnel illumination was measured in the cabin through the windshield, hence this was the value perceived by the driver.

Results

Most of the underground line and stations are underground, with exception of the end stations and turning places, which are at the surface level. The driver's task is to operate speed and check the instruments on the instrument panel, check signals and respond to these if required. At stations the driver has to monitor passengers getting in and out of the underground train and operate the doors. As the largest part of each journey is traveled underground, lighting is artificial. Sources are the incandescent lamps placed on the cabin ceiling, and in the tunnel tubular fluorescent lamps with a protective screen on the tunnel walls at the right and left; and the exterior incandescent lamps of the train itself. In stations tubular fluorescent lamps with protective screen are placed on the platform ceiling and on the walls.

The illumination levels were: in the cabin, 5-10 lx, in the tunnel and 10-15 lx in stations; in the tunnel, 0.25-5 lx at the exterior lamps of the cabin, 130 lx in the

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