

ATTACHMENT 7

V. Louhevaara et al, *Cardiorespiratory strain in jobs that require respiratory protection*, 55 Int. Arch. Occup. Environ. Health 195 (1985)

**COMMENTS TO PROPOSED RULE ON APPROVAL TESTS AND
STANDARDS FOR CLOSED-CIRCUIT ESCAPE RESPIRATORS**

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Cardiorespiratory strain in jobs that require respiratory protection

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Summary. Twenty-one workers in the construction, foundry, shipyard, and metal industries, and nine firemen were studied in jobs that require the regular use of various industrial respirators. The subjects' heart rates (HR) were continuously recorded during 1 to 2 workshifts or during special tasks. Their oxygen consumption (\dot{V}_{O_2}) and ventilation rates were measured during main work phases. The subjects' $\dot{V}_{O_{2max}}$ were determined by a submaximal bicycle-ergometer test. In construction and industrial jobs, when a filtering device or an air-line apparatus was worn, the subjects' mean HR-values ranged from 66 to 132 beats min^{-1} , which is equivalent to a relative aerobic strain of 12 to 57% $\dot{V}_{O_{2max}}$. In smog-diving and repair and rescue tasks with self-contained breathing apparatus and protective clothing, the corresponding mean values were 142 to 160 beats min^{-1} and 54-74% \dot{V}_{O_2} , respectively. The field results were compared with those measured in the laboratory with the same type of respirator. The suitability of different respirators in practical work situations was then evaluated, as were the physical qualifications required of the wearer.

Key words: Industrial respirators - Field conditions - Heart rate - Oxygen consumption - Ventilation rate

Introduction

Industrial respirators are used to protect the wearer against contaminated atmospheres. Respirators must be worn if primary preventive controls involving technical and organizational arrangements at work prove to be insufficient.

Industrial respirators are usually classified with regard to their technical features and effectiveness into three major categories: filtering (air-purifying) devices, air-line (supplied-air) apparatus, and self-contained breathing apparatus (Raven et al. 1979). Filtering devices contain dust and/or gas filters. Air-