

Abstract

Welding Fume and Metals Exposure Assessment among Construction Welders

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OBJECTIVES: The objective of this study was to evaluate welding fume and heavy metals exposure assessment among construction welders. Construction workers have not been studied well in terms of their hazards exposure and adverse health effect. However, manganese poisoning of welders in the construction industry has become social issues in South Korea.

METHODS: Activity-specific personal air samplings(n=206) were carried out in 3 apartment, 2 office and 2 plant buildings construction sites by using PVC(poly vinyl chloride) filter with personal air samplers. Welding fume was analyzed by weight balance and hazardous metals analyzed by inductively coupled plasma equipment. The concentration of fume and metals were showed by five different types of construction welding job(general building pipefitter, chemical plant pipefitter, boiler maker, ironworker, metal finishing welders). Occupational risk assessment was calculated on the basis of the probability of exceeding exposure limits using by Bayesian statistical analysis.

RESULTS: For general building pipefitter, the probability of exceeding exposure limits for welding fume was 48%, zinc oxide was 15%, manganese was 9%, lead was 6%. For chemical plant pipefitters, All investigated hazards have been assessed as not likely to exceed exposure limits. For boilermakers, the probability of exceeding exposure limits for welding fume was 6.8%, manganese was 2.4%. For ironworkers, the probability of exceeding exposure limits for welding fume was 32%, manganese was 3.7%, lead was 5%. For metal finish welders, All investigated hazards have been assessed as not likely to exceed exposure limits. Among the different types of welding methods, the concentration of welding fume was highest at CO₂(2.08mg/m³)following by SMAW (shield metal arc welding as 1.54 mg/m³) and TIG(tungsten inert gas as 0.70mg/m³). Among the different types of workplace, the concentration of welding fume was highest at underground workplace (1.97mg/m³) following by outdoor (0.93mg/m³) and indoor (wall-opening as 0.87 mg/m³). Specifically comparing of workplace of general building welders, the concentration of welding fume was highest at underground workplace (7.75mg/m³) following by indoor (wall-opening as 2.15mg/m³).

CONCLUSION: It was found that construction welders have the risk of expose to welding hazards level of exceeding the exposure limits. In particular, welding high-risk job as general building pipefitters and ironworkers, underground welding work and CO₂ welding operations needed special occupational health management of the use of air supply and exhaust equipment, special safety and health education and fume mask are necessary. In addition, there is a need to establish construction specific work

monitoring system, health planning and management practices.