



LUND UNIVERSITY

Workplace Measurements and Studies of Physiological Responses of Welding Fume Exposure

Isaxon, Christina; Hagerman, I; Andersson, Ulla B; Assarsson, Eva; Berglund, M; Broberg Palmgren, Karin; Dahl, Andreas; Dierschke, Katrin; Gudmundsson, Anders; Karlsson, Jan-Eric; Kåredal, Monica; Jönsson, Bo A; Jönsson, Lena S; Pagels, Joakim; Swietlicki, Erik; Tinnerberg, Håkan; Wierzbicka, Aneta; Nielsen, Jörn; Bohgard, Mats

Published in:
Arbete och hälsa

2011

[Link to publication](#)

Citation for published version (APA):

Isaxon, C., Hagerman, I., Andersson, U. B., Assarsson, E., Berglund, M., Broberg Palmgren, K., Dahl, A., Dierschke, K., Gudmundsson, A., Karlsson, J.-E., Kåredal, M., Jönsson, B. A., Jönsson, L. S., Pagels, J., Swietlicki, E., Tinnerberg, H., Wierzbicka, A., Nielsen, J., & Bohgard, M. (2011). Workplace Measurements and Studies of Physiological Responses of Welding Fume Exposure. *Arbete och hälsa*, 45(5), 40-40.

Total number of authors:
19

General rights

Unless other specific re-use rights are stated the following general rights apply:
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Read more about Creative commons licenses: <https://creativecommons.org/licenses/>

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

LUND UNIVERSITY

PO Box 117
221 00 Lund
+46 46-222 00 00

40) Workplace measurements and studies of physiological responses of welding fume exposure.

C. Isaxon¹, I. Hagerman⁴, U.B.K. Andersson², E. Assarsson², M. Berglund⁴, K. Broberg², A. Dahl¹, K. Dierschke², A. Gudmundsson¹, J.E. Karlsson², M.H. Kristiansson², B.A.G. Jönsson², L.S. Jönsson², J. Pagels¹, E. Swietlicki³, H. Timmerberg², A. Wierzbicka¹, J. Nielsen², M. Bohgard¹

¹Division of Ergonomics and Aerosol Technology, Lund University, Sweden

²Division of Occupational and Environmental Medicine, Lund University, Sweden

³Division of Nuclear Physics, Lund University, Sweden

⁴Department of Cardiology, Karolinska University Hospital, Huddinge, Sweden

Nano sized particles, often enriched in health relevant species, for example metals, occur at high concentrations in many industrial work places. Important sources are thermal processes as welding, which is associated with for example an increased prevalence of bronchitis and other respiratory illnesses.

Three different industrial welding work shops were examined in detail using a wide range of aerosol characterization techniques. At each workshop samples were taken both of the background and of the plume. From the in-plume measurements the signature of welding fume was determined and by using detailed notes of activities the signature size distributions of other processes were identified from the background measurements.

MAG welding fume with the same characteristics as in the workshops was generated and supplied to a 21.6 m³ exposure chamber. The aerosol flow was diluted with clean air prior to entering the exposure chamber. A series of chamber exposure experiments were conducted, where thirty healthy male test subjects, normally working in mechanical workshops, were exposed to welding fume in the chamber for six hours. Concentrations were in the range of what was found in the real environments. Particle sizes ranged from a few to several hundreds of nanometers. The exposures were conducted according to a double blind protocol. Prior to the provocations, test subjects underwent a physical examination. Medical and work history was registered. Before and after exposure, samples were taken for analysis of biological markers (oxidative stress and inflammation). Lung function and nasal patency were measured by spirometry and acoustic rhinometry. Several ten minute series of ECG were regularly registered during the exposure event. Effects on cardiac autonomic control were studied by heart rate variability spectral analysis.

Welding fume induced a significant change of the variability in low frequency (LF) spectral band ($p < 0.05$) while no effects were seen in the high frequency (HF) spectral band. The opposite phenomena was seen during clean air, with a significant change of the variability in the HF spectral band ($p < 0.001$). Exposure to nano-sized particles from welding fume seem to have an impact on heart rate variability, mediated by different aspects of autonomic cardiovascular control.

NR 2011;45(5)

55th Nordic Work Environment Meeting
(Nordiska Arbetsmiljömötet)

The Work Environment – Impact of Technological, Social and Climate Change

*Editors: Maria Albin, Johanna Alkan-Olsson, Mats Bohgard,
Kristina Jakobsson, Björn Karlson, Peter Lundqvist,
Mikael Ottosson, Fredrik Rassner, Måns Svensson, and
Håkan Tinnerberg.*

VETENSKAPLIG SKRIFTSERIE

ARBETE OCH HÄLSA

NR 2011;45(5)

55th Nordic Work Environment Meeting
(Nordiska Arbetsmiljömötet)

The Work Environment – Impact of Technological, Social and Climate Change

*Editors: Maria Albin, Johanna Alkan-Olsson, Mats Bohgard,
Kristina Jakobsson, Björn Karlson, Peter Lundqvist,
Mikael Ottosson, Fredrik Rassner, Måns Svensson, and
Håkan Tinnerberg.*

ARBETE OCH HÄLSA

|

VETENSKAPLIG SKRIFTSERIE

ISBN 978-91-85971-32-9

ISSN 0346-7821