

Focus on IFA's work

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Hand-arm vibration: risk assessment of stoneworking machinery

Problem

Work involving hand-held stoneworking machines may expose users to vibration impact hazardous to health. Under the EU Vibration Directive 2002/44/EC, implemented in the German Noise and Vibration Protection Ordinance, the necessary risk assessment may be performed either by measurements or by estimation based upon information issued by the manufacturer.

The vibration values measured by manufacturers under laboratory conditions are emission values, and may differ from the exposure values measured at the workplace. For the avoidance of false estimations, the manufacturer's information must be corrected by an appliance-specific factor in accordance with draft standard CEN/TR 15350. The reliability of the correction factor, which is determined empirically, was to be validated in the course of implementation of the EU directive.

Activities

Vibration measurements were performed under practical operating conditions in accordance with DIN EN ISO 5349 on ten typical orbital and concrete sanders, abrasive cutting-off grinders, wall chasers, and slitting tools.

Results and Application

The total vibration value of the appliances studied lay between $a_{hv} = 3.6 \text{ m/s}^2$ and $a_{hv} = 11.6 \text{ m/s}^2$. Comparison of the vibration values obtained by practical measurements on the appliances with



Wall chaser used for cutting grooves in sand-lime brick

those indicated by the manufacturers enabled isolated underestimation of the hazard to be corrected for the greater part by adjustment by the appliance-specific factor. Following adjustment of the values, a minor underassessment was found in only three out of ten cases. These deviations lie within the range of the measurement accuracy for in-plant measurements, however. On the appliances studied, the action limit specified in the Noise and Vibration Protection Ordinance is exceeded beyond a daily exposure duration of between 22 minutes and approximately 4 hours, depending upon the appliance. We recommend that the IFA vibration calculator and FA information sheets No 17 and 52 be used to quantify the risk for a specific appliance.

Area of Application

Construction industry and trades

Additional Information

- Vibration calculator for hand-arm vibration exposure, www.dguv.de/ifa, Webcode [d3245](#) (in German only)
- Gefährdungsbeurteilung „Vibrationen“ bei handgeführten und -gehaltenen Arbeitsmaschinen: Hinweise zur Nutzung von Herstellerangaben aus Bedienungsanleitungen. Fachausschuss-Informationsblatt Nr. 17 (07.06). Hand-Arm-Vibrationen. Checkliste zur Gefährdungsbeurteilung. Fachausschuss-Informationsblatt Nr. 52 (12.10). Published by: Fachausschuss Maschinenbau, Fertigungssysteme, Stahlbau, Mainz, www.bghm.de, Webcode [796](#)
- Pre-standard DIN V 45694: Mechanical vibration – Guideline for the assessment of exposure to hand-transmitted vibration using available information including that provided by manufacturers of machinery (07.06) (CEN/TR 15350:2006). Beuth, Berlin 2006
- DIN EN ISO 20643: Mechanical vibration – Hand-held and hand-guided machinery – Principles for evaluation of vibration emission (03.05). Beuth, Berlin 2005
- DIN EN ISO 5349: Measurement and evaluation of human exposure to hand-transmitted vibration – General requirements, Part 2: Practical guidance for measurement at the workplace (12.01). Beuth, Berlin 2001
- Directive 2002/44/EC of the European Parliament and of the Council on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration). OJ EC No. L 177/13, 6 July 2002
- Occupational Health and Safety Ordinance on Noise and Vibration (Lärm- und Vibrations-Arbeitsschutzverordnung) of 6 March 2007. BGBl. I (2007), pp. 261-277
- Technische Regel zur Lärm- und Vibrations-Arbeitsschutzverordnung (TRLV Vibrationen) of 10 March 2010. GMBI. (2010), No 14-15, pp. 271 ff.
- Kaulbars, U.: Risk assessment of hand-arm vibration by estimate, taking the example of hand-guided stone-working machines. Proceedings of the First American Conference on Human Vibration. NIOSH Publication No. 2006-140, pp. 117-118
www.cdc.gov/niosh/docs/2006-140/

Expert Assistance

IFA, Division 4: Ergonomics – Physical environmental factors

Literature Requests

IFA, Zentralbereich