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 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)
- 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

Expert Assistance
IFA, Division 4: Ergonomics – Physical environmental factors

Literature Requests
IFA, Zentralbereich