

Focus on IFA's work

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Hand-arm vibration: Protection by using low-vibration equipment and machines

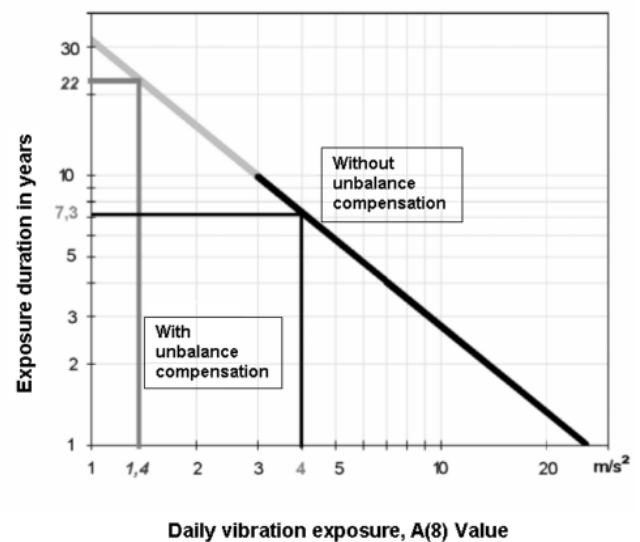
Problem

Users of hand-held powered equipment and machines are exposed to vibration. High vibration over a prolonged period can cause health damage. Costs amounting to about €24 million per year are incurred by the social accident insurance institutions due to vibration-related disorders of the hand-arm system, i.e. occupational diseases 2103 "Diseases caused by vibration at the workplace from pneumatic tools" and 2104 "Vibration-related circulatory disorders in the hands (white finger disease)".

Activities

To make it possible to compare the vibrations caused by equipment, the vibration values are determined under standardized measurement conditions. The degree of vibration is expressed by the total vibration value a_{hv} of the assessed acceleration a_{hw} in m/s^2 . Under the EC Machinery Directive, manufacturers of hand-held equipment are obliged to state the vibration value in the instructions.

The vibration measured under real working conditions in the course of risk assessment may deviate from this value. The IFA determines vibration values and ascertains the vibration at the workplace.



Assessment of the risk of white finger disease from grinding (to DIN EN ISO 5349-1)

Results and Application

The figure shows an example of the reduction of the vibration risk with technical vibration protection measures on a low-vibration, unbalance-compensated grinder compared to a conventional grinder. The data refer to a daily vibration load A(8) with a daily exposure time of 2 hours and 45 minutes.

If a conventional grinder is used with a daily vibration exposure of 2 hours and 45 minutes, there is a risk of contracting white finger disease after seven years. If a low-vibration grinder is used, this risk only arises after 22 years.

Area of Application

Construction industry, metalworking industry, crafts & trades

Additional Information

- Kaulbars, U.: Messung, Bewertung und Beurteilung der Hand-Arm-Vibrationsbelastung an Arbeitsplätzen. Code 210 520. In: IFA-Handbuch Sicherheit und Gesundheitsschutz am Arbeitsplatz. 48. Lfg. V/2006. Ed.: Deutsche Gesetzliche Unfallversicherung (DGUV), Berlin. Erich Schmidt, Berlin 2003 – Loose leaf edition www.ifa-handbuchdigital.de/210520
- Schwingungs-Belastungs-Rechner für Hand-Arm-Vibration, www.dguv.de/ifa, Webcode [d3245](#) (in German)
- Lärm- und Vibrations-Arbeitsschutzverordnung (LärmVibrationsArbSchV) vom 6. März 2007. BGBl. I (2007), S. 261-277
- Technische Regel zur Lärm- und Vibrations-Arbeitsschutzverordnung (TRLV Vibrationen) vom 10. März 2010. GMBI. (2010), Nr. 14-15, S. 271 ff.
- DIN EN ISO 5349: Mechanische Schwingungen – Messung und Bewertung der Einwirkung von Schwingungen auf das Hand-Arm-System des Menschen. Teil 1: Allgemeine Anforderungen, Teil 2: Praxisgerechte Anleitung zur Messung am Arbeitsplatz (12.01). Beuth, Berlin 2001
- DIN EN ISO 20643: Mechanische Schwingungen – Handgehaltene und handgeführte Maschinen – Grundsätzliches Vorgehen bei der Ermittlung der Schwingungsemission (03.05). Beuth, Berlin 2005
- VDI 2057: Einwirkung mechanischer Schwingungen auf den Menschen. Blatt 2: Hand-Arm-Schwingungen (05.12). Beuth, Berlin 2012
- DIN V 45 695: Hand-Arm-Schwingungen – Leitfaden zur Verringerung der Gefährdung durch Schwingungen – Technische und organisatorische Maßnahmen (04.96). Beuth, Berlin 1996

Expert Assistance

IFA, Division 4: Ergonomics – Physical environmental factors

Literature Requests

IFA, Zentralbereich