

Noise emission from fastener driving tools

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Noise emission from fastener driving tools

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The Supply of Machinery (Safety) Regulations 1992 as amended place duties on machine manufacturers and suppliers to design and construct machinery in such a way that noise emissions are reduced to the lowest level taking account of technical progress and the availability of techniques for reducing noise, particularly at source. There is also a requirement that manufacturers and suppliers provide information on the airborne noise emissions of their products. The Control of Noise at Work Regulations 2005, which came into force in April 2006 implementing the EU Physical Agents (Noise) Directive (2003/10/EC), state that employers may use manufacturers' tool data to assess the risk to their employees from exposure to noise.

The aims of the work reported here were to:

- Measure the noise emission of the tools supplied by the manufacturers and compare to the manufacturers' declared emission, if stated.
- Determine whether tools with a declared noise emission have been tested in accordance with the most appropriate test code.
- Comment on the suitability of the noise test methods for the family of tools under test.
- Investigate the link between the manufacturers' declared emission and the in real use emission.

This project was carried out in conjunction with HSL project JR45.086, an investigation into the correlation between vibration emission and vibration during real use on fastener driving tools as reported in RR591.

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EXECUTIVE SUMMARY

Objectives

The Supply of Machinery (Safety) Regulations 1992 as amended place duties on machine manufacturers and suppliers to design and construct machinery in such a way that noise emissions are reduced to the lowest level taking account of technical progress and the availability of techniques for reducing noise, particularly at source. There is also a requirement that manufacturers and suppliers provide information on the airborne noise emissions of their products. The Control of Noise at Work Regulations 2005, which came into force in April 2006 implementing the EU Physical Agents (Noise) Directive (2003/10/EC), state that employers may use manufacturers' tool data to assess the risk to their employees from exposure to noise.

The aims of the work reported here were to:

- Measure the noise emission of the tools supplied by the manufacturers and compare to the manufacturers' declared emission, if stated
- Determine whether tools with a declared noise emission have been tested in accordance with the most appropriate test code
- Comment on the suitability of the noise test methods for the family of tools under test
- Investigate the link between the manufacturers' declared emission and the in real use emission

This project was carried out in conjunction with HSL project JR45.086, an investigation into the correlation between vibration emission and vibration during real use on fastener driving tools as reported in NV/06/24.

Main Findings

Where

$L_{pA,1s}$: A-weighted single-event emission sound pressure level at the workstation (dB)

$L_{WA,1s}$: A-weighted single-event sound power level (dB)

- The quality of declared airborne noise emission data varied between manufacturers. Two out of the 11 tools used in this project were supplied with inappropriate or clearly erroneous data (Tools C and K respectively). While the Supply of Machinery (Safety) Regulations 1992 as amended, and related transposed standards for the family of tools under consideration, are clear about declaration requirements, the information available with tools is not always consistent or transparent.
- HSL was able to verify the manufacturers' declared emissions for five of the 11 tools tested for the $L_{WA,1s}$ parameter. A sixth tool (Tool D) verified for the $L_{pA,1s}$ parameter. The two parameters are derived from independent measurements, although they may be made at the same time during the same operation. This could be a flaw in the test method with limited measurement positions not accurately capturing a highly directional noise source.
- Provided all conditions are maintained, the standard laboratory test is repeatable, though not necessarily reproducible for the determination of $L_{pA,1s}$. If a variable is introduced, for

example, a change in operator, the uncertainty of measurement can increase beyond the uncertainty value attached to the noise descriptor.

- For the determination of $L_{WA,1s}$, the standard laboratory test is not sufficiently repeatable or reproducible.
- The actuation mode of the tool (contact, single sequential or full sequential) does not affect the noise emitted from the tool beyond the uncertainty value attached to the noise descriptor.
- The test method described in BS EN 12549:1999 has the potential to distinguish between low and high noise tools even though the tool types covered by the standard are very different. Significantly more field data is required to determine whether users can reliably make use of emission data to identify low or high noise tools in practice. The relationship between the declared emission, laboratory measured emission and the field data could not be determined.
- Field measurements showed that in real use noise emissions may vary by up to 15 dB on a single tool dependent on the process, workpiece and the working environment. Noise from fastener driving tools is likely to be a significant contributor to risk of hearing damage if a person is exposed to more than about 500 events per day (an $L_{pA,1s}$ value in the region of 98 to 100 dB giving an equivalent eight-hour daily personal exposure, $L_{EP,d}$, of approximately 81 dB). For other tools the risk could be significant after only 100 events per day (an $L_{pA,1s}$ value of 105 dB giving an equivalent $L_{EP,d}$ of approximately 80 dB).

Recommendations

- Alert tool manufacturers to their duties under SM(S)R with regards to provision of airborne noise emission data.
- Advise standards bodies and tool manufacturers that repeatability and reproducibility of declared emissions is not sufficiently high.
- Alert end-users of tools that the declared noise emissions may not sufficiently indicate the risk to the worker.

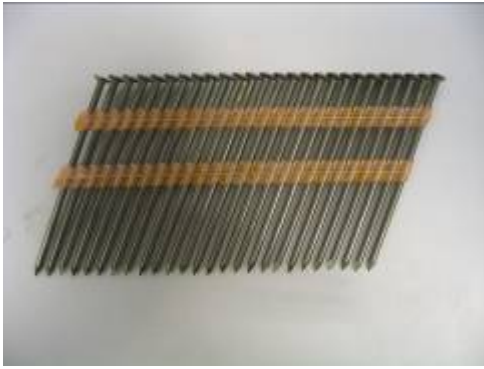


Figure 2a. Strip nails

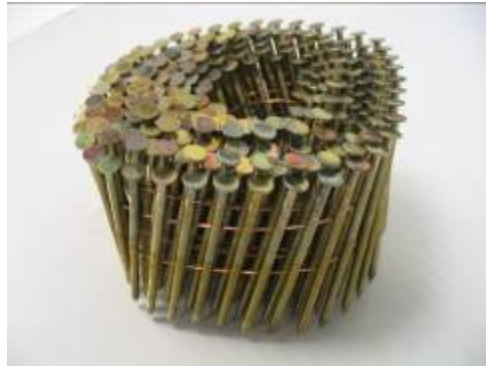


Figure 2b. Coiled nails



Figure 2c. Staples

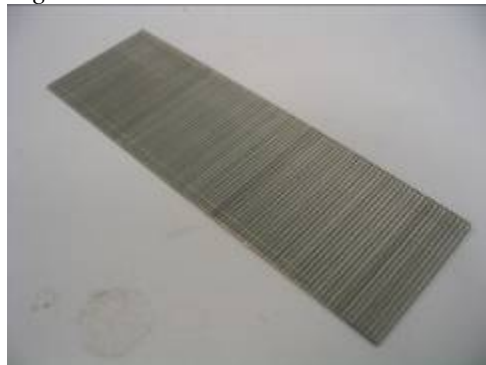


Figure 2d. Brads



Figure 2e. Corrugated fasteners

