

NOISE IN KERBSIDE GLASS COLLECTION USING NOISE ASSESSMENT TO ESTIMATE NOISE EXPOSURE

This WISH information document is aimed at health and safety improvements in the waste management industry. The Health and Safety Executive (HSE) was consulted in the production of this publication. It endorses the sensible, proportionate, reasonable and balanced advice to owners on managing the risk from noise in kerbside glass collection during the waste-related activities as set out in the guidance.

Contents

Introduction

Why and when you should measure noise

What is noise measurement?

What is noise exposure?

Some technical terms you need to know for this document

Measuring equipment

Carrying out a noise measurement: practical step-by-step advice

Using your measurement data to estimate noise exposure (worked example)

Introduction

This Information Document is the first of a series relating to noise issues arising from kerbside waste glass collections. Its content supplements the other published document in the series “Noise in kerbside glass collection: hearing protection and health surveillance”. The general principles in all the documents are applicable to other waste and recycling streams. This document is aimed at employers, managers and supervisors. It provides step by step advice on the methodology of measuring noise and the equipment required. It also provides a worked example. The guidance is based on Appendix 1 of HSE publication - L108 Controlling Noise at Work (second edition 2005).

Why and when you should measure noise

Exposure to harmful noise in the workplace can result in occupational deafness and tinnitus. Both of these are invisible, incurable and irreversible. But they are entirely preventable. People who have occupational deafness or tinnitus suffer not only in their working lives but also in their personal lives, struggling to join in at social occasions, hear alarms, or even hear their own families.

Estimating a person's noise exposure due to their work allows you to take action to reduce their exposure and still protect them when necessary. Taking measurements to establish noise exposure estimates involved in glass collections is unnecessary. The high noise risk areas of the work are well known and have been measured before. They are documented in:

- WISH Waste 16 - Reducing noise risks from "kerbside" glass collection
- WRAP Report- Noise Exposure in glass collections for recycling August 2012

If after reading Waste 16 and WRAP Report you decide you have an innovative system which is not covered, or perhaps have carried out noise reduction techniques/trials and wish to establish the results, then you should follow this guidance document. **OTHERWISE DO NOT 'WASTE' YOUR TIME OR MONEY AND USE THE ALREADY PUBLISHED ESTIMATES.**

What is noise measurement?

Noise measurement is the act of gathering activity durations and noise level information for a person's job. For kerbside glass collections it is all about the different parts of the job. For example, collecting recycling boxes, kerbside sorting, tipping boxes and all other activity associated with kerbside glass collection.

Noise measurement is as much about observation of the activities as it is about measuring them. If there's a noisy process that never has a person involved or nearby, ask yourself if that process is going to have an influence on any person's noise exposure.

What is noise exposure?

Noise exposure is the combination of noise level, activity duration and, depending on the situation, the number of repeated activities during a working period. Noise exposure can be estimated in a number of different ways but will always require these two (or three) pieces of information.

For kerbside glass collections two distinct methods are likely to be needed. One to estimate the overall noise exposure from a collection round and one to determine the contribution from glass hitting glass (a noise event) to that overall exposure.

Some technical terms you need to know

- **T** : the duration (time) associated with your noise level. This can be in seconds, minutes or hours as long as you remain consistent throughout any calculations.
- **L_{Aeq}** : equivalent continuous A-weighted sound pressure level. For the noise level you measure for duration T it is often notated as $L_{Aeq,T}$. It has the unit of decibels (dB).
- **$L_{EP,d}$** : the daily personal noise exposure. This is the continuous equivalent A-weighted sound pressure level that the person would experience if they were exposed to an equivalent steady state noise for 8 hours. It has the unit of decibels (dB) sometimes followed by an (8-hour) - **N.B.** that this is a noise exposure, not a noise level.
- **Exposure points**: an alternative system of quantifying exposures, equivalent to an $L_{Aeq,T}$. Exposure points are useful because you can simply add them up, something you can't do with decibels.
- **L_{Cpeak}** : the instantaneous C-weighted peak sound pressure level. It has the unit of decibels (dB).

Measuring equipment

Whatever equipment you use, read the instructions. Take up any offers of training by equipment manufacturers and suppliers. If you are not sure, ask.

Waste Industry Safety and Health Forum

The sound level meter

- The basic instrument for measuring noise is a sound level meter (SLM). There are lots of different types available. Advances in technology mean they are generally very capable and easy to use
- Your SLM should be at least a “Class 2” instrument in accordance with the BS EN ISO 61672-1 standard and should be appropriately marked as such. Your SLM should be at least capable of measuring the L_{Aeq} and the L_{Cpeak} . More sophisticated instruments will measure other parameters as well
- A SLM needs a person to operate it throughout the measurement (i.e. it is a supervised measurement). This person should not be the person doing the job for which noise is being assessed

The dosimeter (or dosimeter)

- A dosimeter is essentially a small SLM that is worn by the person doing the job for which noise is being assessed
- Dosimeters may be preferred to a SLM if a person is highly mobile or working in places where access for measurement is difficult
- Dosimeters have no class numbers like a SLM, but they should meet the BS EN 61252 standard and be appropriately marked as such
- People wearing dosimeters should be instructed not to interfere with the dosimeter. They should also be instructed not to speak more than is necessary during the course of the measurement to exclude their own voice in any assessment of their daily personal noise exposure
- Dosimeter measurements are unsupervised

The calibrator

- A calibrator should be used to check your measuring instrument at the beginning and end of each measurement day – and in-between if required. A calibrator produces a tone at a known sound pressure level and frequency. It must be used with the correct coupling adaptor for your microphone type. Make sure you have the right calibrator with the right adaptor for your microphone
- Some instruments have internal electronic calibration. The internal calibration only checks the instrument's electronics and does not provide a check of the microphone

- Your calibrator should be at least a “Class 2” instrument in accordance with the BS EN 60942 standard and should be appropriately marked as such

Carrying out a noise measurement: practical advice

Before you start measuring

Find out as much as you can about the waste/recycling collection round because the better prepared you are, the more representative your measurement will be and the better your noise exposure estimate will be. Find out things like:

- usual time taken to complete the round
- the approximate number of recycling boxes picked up
- how many people are usually on the round
- who does what job
- if operatives stick to the same job or rotate jobs
- the vehicle used
- the risks other than noise associated with the job, etc.

Tell the collection team that you are going to be there and why you are going to be there. Answer their questions honestly. Ask some of your own to make sure you know how, where and when you can make your measurements safely and efficiently.

Check your measurement equipment using your calibrator. There is little point going out to measure if your instrumentation is not working or is faulty.

Out on the round

- Observe the job(s). Decide if there is a pattern or process that is repeated. If there is, could you measure for a small number of repeats of that process and then multiply that up to represent the full collection?
- Remember that your noise measurement will be used to estimate a noise exposure. You need to be satisfied that what you measure is representative. Within a dB or so is accurate enough. Decimal points have no place in your measurement

Waste Industry Safety and Health Forum

- Remind people why you are there. Do ask questions, be open and communicative. Make notes and write things down. You will not remember everything later
- Make sure you do not create any risks by your presence

Supervised noise measurements using your SLM

Measure the L_{Aeq} for each process or activity during the round, and note the time taken to do each process or activity. From your earlier observations you should have a rough idea of what each process and activity is, for example kerbside sorting a co-mingled recycling box, tipping a glass-only box into a slave bin or pod, operating the vehicle controls, etc.

Measurements should be made at the position occupied by the person's head. The microphone should be positioned about 15cm from the person's ear in the area between their ear and shoulder. The microphone should be placed to the side of the head where the noise levels are highest. You might have to make some measurements to find out which side is noisiest. In general:

- If the noise is steady, a short sample L_{Aeq} measurement may be enough
- If the noise is changing, wait for the L_{Aeq} reading to settle to within 1 dB
- If the noise is from a cyclic process or activity measure the L_{Aeq} over a whole number of cycles

You may also want to measure individual L_{Cpeak} values for short-duration e.g. high-level noise events such as a fast tip of a recycling box.

Unsupervised noise measurements using your dosimeter

Dosimeters are designed to operate for long periods. They suit measurement over an entire round. If you measure over part of a round, make sure the measurement duration covers all significant noise exposure, so as to be typical of the working day, so that you can reliably predict the full daily exposure. Avoid very short measurements.

From your observations select a suitable person to wear the dosimeter. Ask them if they are willing to wear the dosimeter. Tell them why you have asked them to wear the dosimeter and the purpose of the measurement.

Position the microphone on the shoulder (ideally on the top of the shoulder joint) and prevent it touching the neck, rubbing on or being covered by clothing or protective equipment. If the dosimeter body is connected to the microphone by a flexible cable, place the dosimeter body securely in a pocket or on a belt where it is out of the way.

Remind the person that the dosimeter is not their own personal karaoke machine! Nor is it for their colleagues. False inputs from unrepresentative noise sources such as artificial bangs, whistling or blowing on the microphone will only mean that you have to repeat the measurement and take up more of their time.

Using your measurement data: worked example

Your observations, durations of measurement and L_{Aeq} data can now be used to estimate a person's noise exposure. The noise exposure estimate is carried out in terms of exposure points. During your time on the collection round you observed and recorded three distinct activities. These activities were:

- Collecting dry mixed recyclables (DMR) – you joined near the end of this activity (of 82dB for a duration of 30 minutes)
- Glass collection – you were present throughout (L_{Aeq} of 97dB for a duration of 30 minutes)
- 20 household recycling boxes of glass, filled to various levels, were tipped during this time but your measurement only included 7
- Food waste collection – you left shortly after this activity started (L_{Aeq} of 84dB for a duration of 45 minutes)

You have data and information for all three activities. You were also told that this pattern of collection would be repeated four times during the working day. You have enough information to estimate the noise exposure for the working day. All exposure points are obtained using either the *HSE daily noise exposure calculator* or the *HSE daily noise exposure ready reckoner*, both free to download from the HSE website.

Waste Industry Safety and Health Forum

DMR: you recorded an L_{Aeq} of 82dB for a duration of 30 minutes. This is equivalent to 3 exposure points for that part of the activity for which you were present. The complete activity actually lasted 90 minutes, 3 times as long, so you can calculate that the complete activity is actually represented by $3 \times 3 = 9$ exposure points. The activity was repeated 4 times during the day so the exposure point value for DMR for the whole day is $4 \times 9 = 36$ exposure points.

Glass collection: you recorded an L_{Aeq} of 97dB for a duration of 30 minutes. This is equivalent to 99 exposure points; however, you also know that 20 boxes were tipped during this time but that you only measured 7 of these. To account for the box tips you didn't measure you must do the following: $99 \times (20 \div 7) = 283$. The activity was repeated 4 times during the day so the exposure point value for glass collection for the whole day is $4 \times 283 = 1132$ exposure points.

Food waste: you recorded an L_{Aeq} of 84dB for a duration of 45 minutes. This is equivalent to 7 exposure points for that part of the activity for which you were present. The complete activity actually lasted 2¼ hours, 3 times as long, so you can calculate that the complete activity is actually represented by $3 \times 7 = 21$ exposure points. The activity was repeated 4 times during the day so the exposure point value for food waste collection for the whole day is $4 \times 21 = 84$ exposure points.

The total number of exposure points for the whole day, including all collections and all four repeats is: $36 + 1132 + 84 = 1252$. If you look this value up on the HSE daily noise exposure ready reckoner, you will find that 1252 exposure points is equivalent to a daily personal noise exposure, $L_{EP,d}$, of 96dB. This estimate allows you to identify the activities contributing most to the person's noise exposure. This will enable you to target those activities with your actions to reduce exposure.



Disclaimer and WISH

This information document has been prepared by health and safety practitioners to assist health and safety improvements in the waste management industry. It is endorsed by the WISH (Waste Industry Safety and Health) Forum. This information document is not formal guidance and represents good practice.

Nothing in this information document constitutes legal or other professional advice and no warranty is given nor liability accepted (to the fullest extent permitted under law) for any loss or damage suffered or incurred as a consequence of reliance on this document. WISH accepts no liability (to the fullest extent permitted under law) for any act or omission of any persons using this document.

This information document is not a substitute for duty holder and/or professional safety advisor's judgment, Notwithstanding the good practice in this document, duty holders are responsible for ascertaining the sufficiency and adequacy of their internal and independent procedures for verifying and evaluating their organisation's compliance with safety law.

The Waste Industry Safety and Health (WISH) Forum exists to communicate and consult with key stakeholders, including local and national government bodies, equipment manufacturers, trade associations, professional associations and trade unions. The aim of WISH is to identify, devise and promote activities to improve industry health and safety performance.

References

- Noise in Kerbside Glass Collection: Hearing Protection and Health Surveillance
- Noise in Kerbside Glass Collection: Noise Control Solutions
- L108 Controlling Noise at Work (second edition 2005) - Appendix 1 of HSE Noise publication
- WISH Waste 16 (Rev1) 06/13 - Reducing noise risk from kerbside glass collection
- Noise Exposure in glass collections for recycling - WRAP Report- August 2012
- HSE daily noise exposure calculator
- HSE daily noise exposure ready reckoner