

Noise Control – Impact, vibration & materials handling

Guidance on selection, use and fit of hearing protectors

June 2017

Background

Employers must ensure employees exposure to noise does not exceed the exposure standard by implementing the following hierarchy of control measures:

- eliminate the source of noise
- substitute noisy plant for quieter plant or processes or implement engineering controls
- use administrative controls
- provide hearing protection.

The noise exposure standard set out in the Occupational Health and Safety Regulations 2017 is an 8 hour average of 85dB (A) and a peak noise level of 140dB(C) at the employee's ear position. Workplace noise that exceeds the noise exposure standard is considered dangerous to employees and must be controlled in accordance with the hierarchy of control.

Employers must apply each level of the hierarchy so far as is reasonably practicable before moving down to the next control measure. This means that an employer cannot go straight to hearing protection without first implementing higher level control measures so far as reasonably practicable.

Often a combination of control measures are required to effectively control risks associated with workplace noise.

Materials Handling

Materials handling in a workplace can generate high noise levels due to impact and mechanical vibration of surfaces such as chutes, hoppers, metal panels, machine guards, covers and conveyors.

Damping

Vibration of structures can also resonate (or 'ring') depending on the size, type and thickness of the material or panel. Resonance (or 'ringing') strongly amplifies the noise emitted by vibrating panels and plates. However, the application of a small amount of damping material can significantly reduce the noise as illustrated in figure 1.

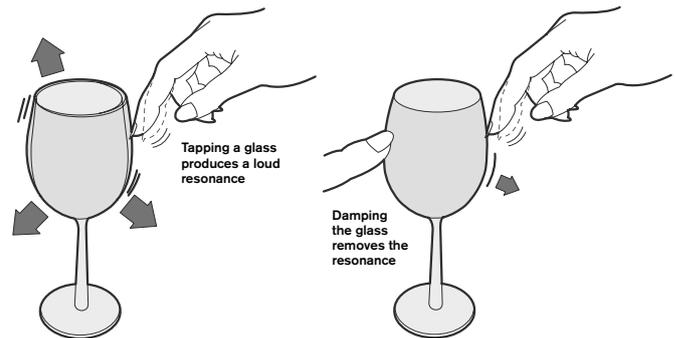


Figure 1: When a wine glass is struck it resonates for quite some time. If the glass is touched with the tip of a finger, the resonance is dampened and the ringing stops.

Damping (sound deadening) involves applying a viscoelastic or bituminous type material (eg mastic, asphalt) to large thin vibrating surfaces such as metal chutes, hoppers and machine guards to reduce the vibration and radiation of noise.

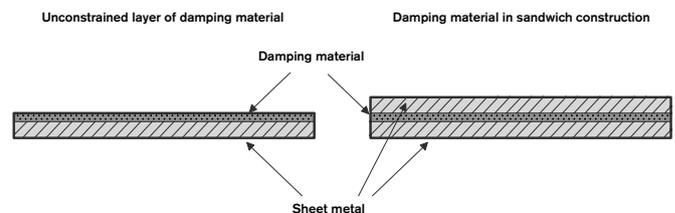


Figure 2: unconstrained (single layer) and constrained (sandwich) damping.

Damping materials can be painted, sprayed, troweled, or glued onto the noisy surface (usually sheet metal). Self-adhesive dampening sheets are also commercially available and can be stuck on the inside or outside of the surface. Noise reductions of 5-25dB(A) can be achieved when most of the surface is covered with a damping layer of at least half the thickness of the panel to be treated.

Constrained damping (figure 2) involves sticking a rigid second layer (even a very thin layer of sheet metal or foil) over the viscoelastic damping layer. This type of damping is more rugged and generally more effective.

Controlling impact or vibration noise

High impact is a common source of noise during materials handling when objects drop from a height onto a hard surface such as metal hoppers or collection bins. The level of noise depends on the size and type of material, weight and speed of the object. Reducing the drop height of an object from 5 meters to 5cm can reduce noise by about 20dB(A).

Control of impact and vibration noise (including resonance) can be achieved by elimination or reducing the force of impact, dampening or stiffening surfaces, isolating mechanical vibration and reducing operating speeds or pressures.

The following is a list of ways to reduce impact or vibration noise:

- reduce drop heights
- change the angle of impact to reduce the force of impact
- use resilient rubber type materials to absorb the impact of falling objects
- use resilient mats for cut-offs falling on the floor below work benches or guillotines
- fit rubber buffers to stop points
- apply a progressive cutting edge to punch tooling on power presses to reduce impact noise
- use conveyor belts rather than rollers which rattle
- use conveyors with spacers to prevent components striking against each other during transportation
- reduce the speed of the conveyor belt
- use wire mesh guards if solid panels vibrate
- use brass or Frehde heliograph I type gears that are dampened and mesh together better
- apply a layer of damping or 'deadening' material (eg bituminous or rubber materials) to vibrating panels
- apply temporary dampening panels to sheet metal during fabrication, cutting and machining
- stiffen/brace surfaces to reduce vibration
- use perforated plates or woven metal mesh instead of sheet metal
- use materials with inherent damping (eg plastic instead of steel)
- clamp work-piece using rubber-lined clamps to reduce vibration
- dampen or increasing mass of work benches to reduce general impact noise.

Examples of noise controls

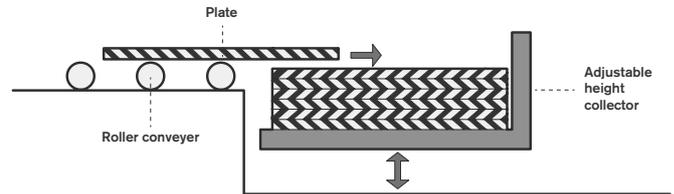


Figure 3: Plates falling from a roller conveyor down on to a collection table causes very intense impact noise. A self-levelling or adjustable table or container reduces the fall height and reduces the noise generated.

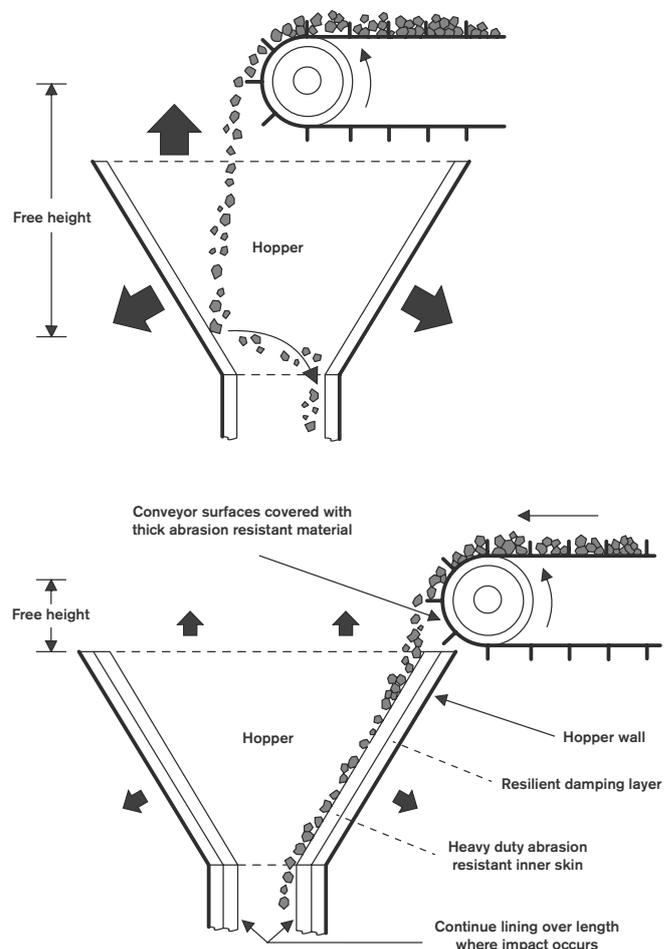


Figure 4: Materials falling from a conveyor belt causes impact noise. Reducing the drop height, lining the hopper with impact absorbing material and damping material will reduce the noise generated.

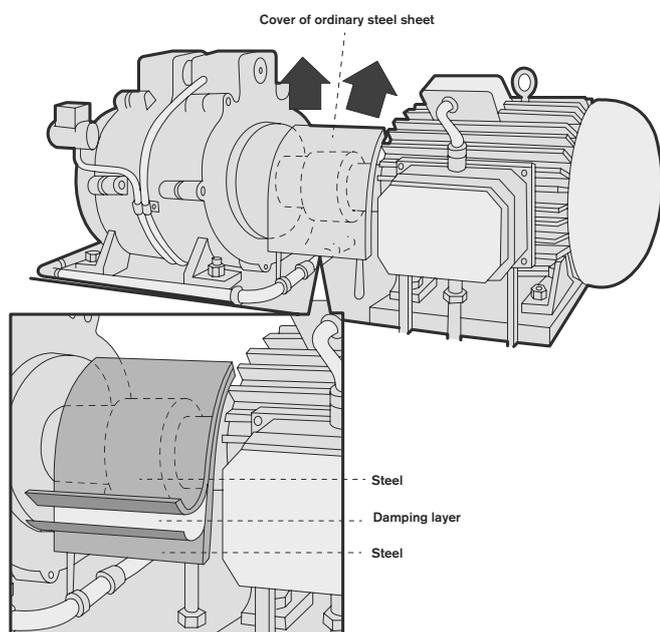


Figure 5: Panels on machinery, motors or pumps are prone to vibration and are therefore a source of radiated noise. Use of a laminated panel with damping properties can reduce noise significantly.

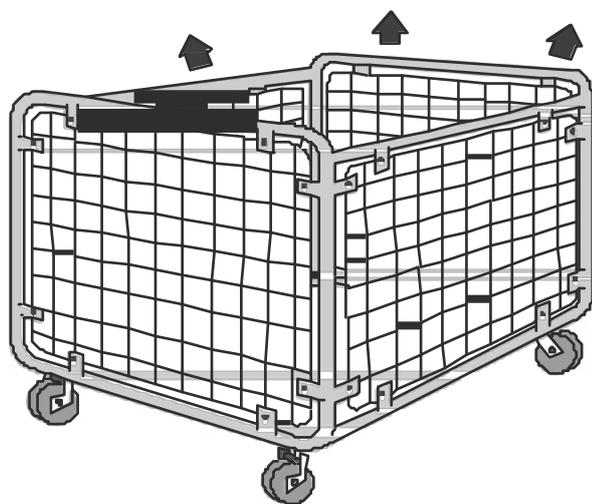


Figure 6. Using a wire mesh bin instead of one made from sheet metal reduces impact noise. Resilient polyurethane type wheels can also be fitted to the bin to reduce rattling on uneven flooring.

Further information

Contact the WorkSafe Victoria Advisory Service on **1800 136 089** or go to **worksafe.vic.gov.au**

WorkSafe Publications

- Noise Control – A step by step approach
- Noise Control – Circular saws
- Noise Control – Compressed air noise
- Noise Control – Enclosures, barriers and screens
- Noise Control – Fan and ventilation noise
- Noise Control – Grinders
- Noise Control – Hearing protection
- Noise Control – Impact, vibration and materials handling noise

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This guidance has been reviewed and updated for the sole purpose of amending year and regulation references relating to the Occupational Health and Safety Regulations, in line with amendments which came into effect on 18 June 2017.