



NOISE

IO2 – EDUCATIONAL MATERIALS



Noise

Noise is, basically, unwanted sound, and is arguably the most commonly experienced industrial hazard.

Loud noise can cause permanent damage to the ear and result in hearing loss.

The human ear is sensitive and delicate and can detect very small changes in sound pressure.



Figure 1 – Welding. Source: <http://auburnmountainhearing.com/hearing-protection/>

Noise

Loud noise, whether continuous or impulsive, can cause permanent damage to the ear and result in hearing loss.

Exposure to loud noise can permanently damage welders' hearing.

Noise also causes stress and increased blood pressure, and may contribute to heart disease.

Working in a noisy environment for long periods of time can make workers tired, nervous, and irritable.



Figure 2 – hearing loss. Source:
<https://www.hearingchoices.com.au/hearing-loss/noise-induced/>

Noise Measurement

Noise is measured in decibels (dB) and is defined as 'the logarithm of the ratio of sound pressure to a reference pressure of the quietest sound able to be perceived', which means that zero dB is, in fact, theoretically silence.

The loudness of a sound, as heard by the human ear, is dependent on both the sound pressure and its frequency, and so noise measurements are given weighting to correspond to the frequency response of the human ear.



Figure 3 – Noise measurement. Source: <https://soundear.dk/blog/saa-meget-stoej-kan-dit-oere-taale/>

Noise

- With the exception of TIG, electric arc welding generates harmful levels of noise.
- The process itself produces noise, the other tasks that a welder will typically do are also noisy, and welding is generally carried out in a noisy environment.
- Noise levels experienced during arc welding and cutting vary with the process.

Process	Typical noise levels
TIG	Up to 75 dB(A)
MMA	85-95 dB(A)
MIG	95-102 dB(A)
Plasma cutting (hand-held up to 100A, cutting up to 25mm thickness only)	98-105 dB(A)
Flame gouging	95 dB(A)
Flame Cutting	Up to 100 dB(A) (typically above 90 dB(A) when cutting thickness above 40 mm)
Air arc gouging	100-115 dB(A)
“Deslagging”/chipping	105 dB(A)
Grinding	95-105 dB(A)

Table 1 – Typical noise levels. Source: <http://www.hse.gov.uk/welding/noise-vibration.htm>

Noise

The actual noise levels will depend on several factors:

- Consumable diameter and with increasing current;
- Type of metal being worked (stainless steel tending to produce higher noise levels than mild steel);
- Where cutting is concerned, the thickness of material being cut;
- The design of air nozzle;

Typical Exposure

- Daily personal noise exposure depends both on the level of noise (the dB(A) value) and the time of exposure during a working day.
- When assessing potential noise exposure an important consideration is how long welding operations last. For welding and hot cutting processes, noise is only generated when an arc is struck or flame lit.
- A production welder's 'arcing' time may be as much as 80% of the shift whereas a fabricator welder may spend most of the day setting the job up before starting any welding.

Typical Exposure

In addition welders frequently work in noisy environments and carry out other noisy operations such as needle scaling and grinding. It is likely that a welder's individual noise exposure will be affected not only by their own work, but also by the work of their colleagues.



Figure 4 – Welding. Source:
<https://blog.nus.edu.sg/syazwibukhari/2016/09/02/2-types-of-noise-pollution//>

Typical Exposure

You should consider these factors when assessing noise risk.

Under-estimating noise risk could lead to damaged hearing however over-estimating noise exposure could lead to unnecessary expense or overprotection.

Control Measures

The best option will be to eliminate the noisy process, perhaps by **buying in the material cut to size by the supplier**. However welding and hot cutting is often the only practical method so the main focus should be on practical methods to reduce noise levels for the given process and managing the residual risk **using ear plugs, ear muffs or other hearing protection**.

Control Measures

An **example** of this would be moving from hand-held plasma cutting to an automated submerged plasma cutter → This can result in noise levels below 80 dB(A).

Submerged or water shrouded systems reduce fume emission as well as noise.

Obviously with any consideration of alternative ways of working, the practicality of the alternative and investment required must be weighed against the benefits (health, safety, productivity, etc.) that may arise.

Control Measures

- As a general rule, noise from arc welding increases with **wire/rod diameter** and operating current. Using a wire/rod size and current that are appropriate for the job ie not excessively large, should help to minimise noise levels [figure 5].
- With **plasma/ flame cutting and arc gouging** noise levels generally increase with increasing gas velocity. Ensuring that the gas velocity is as low as possible (eg reducing the outlet pressure at the regulator) will generally reduce the noise levels. Obviously there is a trade off between productivity rate and gas pressure however there will be a cross over where increased gas pressure does not significantly increase productivity.

Control Measures

- Welding in confined spaces or other areas where **sound may be reflected** (such as the corner of a workshop) can give higher noise levels than if the welding is carried out in an open space. If it is not possible to organise the work to avoid these situations, the addition of sound absorbing materials to the reflective surfaces can be helpful in reducing the impact of the welding noise on others working nearby [figure 7].

Control Measures – examples

Control measures - examples



Figure 5 – Pipeliner. Source:
[https://www.lincolnelectric.com/en-za/consumables/Pages/product.aspx?product=Products_Consumable_Flux-CoredWires-Gas-Shielded-Pipeliner-PipelinerG80M\(LincolnElectric\)&detail=ED031107\(LincolnElectric\)](https://www.lincolnelectric.com/en-za/consumables/Pages/product.aspx?product=Products_Consumable_Flux-CoredWires-Gas-Shielded-Pipeliner-PipelinerG80M(LincolnElectric)&detail=ED031107(LincolnElectric))

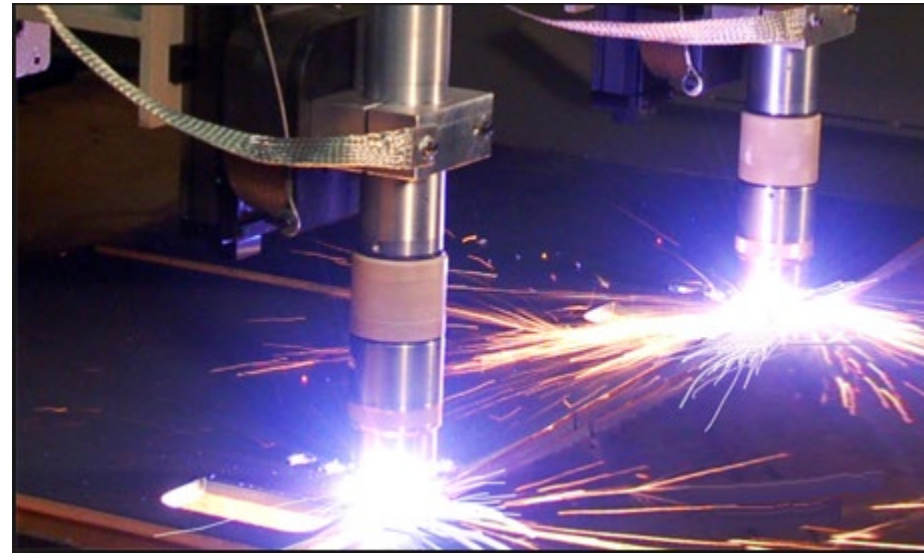


Figure 6 – Plasma Cutting. Source:
<https://www.messer-cs.com/us/processes/plasma-cutting/>



Figure 7 – Welding Booth. Source:
<https://www.lincolnelectric.com/en-za/education-center/pages/educational-training-equipment.aspx/>

Hearing Protection

Hearing protection should be selected based on four criteria; ability to reduce the noise exposure, compatibility with other items of PPE (such as welding masks, safety helmets, etc.), comfort, and suitability for the working environment and activity.

For compatibility with welding masks, options include ear plugs and slim-line ear muffs with a neckband rather than a head band.

Hearing Protection

If, as may be the case with some welding activities, hearing protection is being relied on as the main solution to reducing noise exposure, it is vital that correct training in its use is given. The importance of wearing the protection for all the time spent in a noisy area, or engaged in a noisy activity, must be emphasised. Failure to wear hearing protection for even a small amount of the time exposed to noise can affect significantly the effectiveness of the hearing protection device in reducing daily noise

Hearing Protection - PPE

Four basic types:

- Molded earplugs;
- Custom-molded earplugs;
- Self-molded earplugs;
- Ear muffs;



Figure 8 – Ear Defender. Source: <https://uk.rs-online.com/web/p/ear-defenders/4496506/>



Figure 9 – Earing Protection. Source: http://www.safetyhow.com/index.php/Personal_Protective_Equipment_-_Hearing_Protection?action=print

Signs



Figure 10 - Hearing Protection's Signs. Source:
https://www.quill.com/safety-signage/accuform-signs/cbc/945.html?BypassCLP=Y&filter=Color+Family_Orange_4294713985



Figure 11 - Hearing Protection's Signs. Source:
<http://safetyrisks.blogspot.com/2016/10/noise-hazards.html>

Hearing Protection

- **Personal issue and visitors:** People should not pass earplugs to one another. Preferably, a set of earmuffs should be used by one individual only. Where earmuffs are kept for the use of visitors, they should be hygienically cleaned for each new wearer. Alternatively, disposable covers may be used.
- **Training and effective use:** Hearing protection will only provide good protection when used properly and fitted correctly. Users must be instructed in its correct fitting and use, including:
 - how to avoid the potential interference of long hair, spectacles and earrings on the effectiveness of their hearing protection;
 - how to wear their hearing protection in combination with other personal protection;

Hearing Protection

- The importance of wearing their hearing protection at all times in a noisy environment (removing it for only a few minutes in a shift will lower the protection to the wearer considerably);
- How to store their hearing protection correctly;
- How to care for and to check their hearing protection at frequent intervals; where to report damage to their hearing protection;

European, National Regulations and Recommendations

- EN 352-1 applies to ear muffs
- EN 352-2 applies to earplugs and otoplasties
- EN 352-3 is intended for variants, for example ear muffs that are attached to a helmet
- EN 352-4 lists the requirements for level dependent ear muffs
- EN 352-5 relates to active noise reduction ear muffs
- EN 352-6 is restricted to hearing protectors with an electrical audio input