Electromagnetic fields (EMF) in the welding environment

Concerns have been raised that the Electromagnetic Fields Directive\(^1\) may have an impact on companies using welding processes. In particular, the major impact may be on those using arc and resistance welding, where the welding currents are high and the operator may be close to the equipment. Other processes, in the welding industry, which may also lead to relatively high exposures, are induction heating, stud welding and magnetic particle inspection. Mechanised variants of the above processes should not in general expose the welder to significant EMFs.

Exposure to EMF can cause localised heating in the body, can affect medical implants and cause sensory effects, such as visual disruption, vertigo or simulation of muscles and nerves. In preparation for the UK’s implementation of the Directive in 2016, it is recommended that potential high risk sources, such as certain types of welding, are identified and the risk assessment reviewed to reduce the exposure\(^2\).

The Health and Safety Executive published a research report that measured EMF produced by different types of welding and the requirements of the Directive. The report can be downloaded here: RR1018 – Electromagnetic Fields (EMF) in the welding environment

The report includes a literature review, measurements of the EMF emission a welder may be exposed to and where welding fits into the requirements of the Directive’s action levels (ALs). The below is a summary on what was assessed, the findings and recommendations to minimise exposure.

<table>
<thead>
<tr>
<th>The welding assessed</th>
<th>Findings</th>
<th>Recommendations to minimise exposure</th>
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</thead>
<tbody>
<tr>
<td>Pulsed MIG/MAG welding.</td>
<td>DC arc welding processes do not exceed the lower ALs.</td>
<td>Maximise distance between the welder, power source and welding equipment.</td>
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<tr>
<td>AC square wave TIG welding.</td>
<td>AC and pulsed arc welding processes the magnetic fields were higher and found to approach the lower ALs.</td>
<td>Welders should not stand within a current loop.</td>
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<tr>
<td>Single phase AC resistance welding.</td>
<td></td>
<td>Route electrode/torch cable and current return cables together or any other electrical cable on one side or the other.</td>
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<tr>
<td>Medium frequency resistance welding.</td>
<td></td>
<td>Welders should not wrap or drape any cables around their body, but should route them away from their body. A minimum of 30 cm distance between the welder and the cable (apart from the hand and the feet) should be maintained.</td>
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<td>Magnetic particle inspection (MPI).</td>
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<tr>
<td>Stud welding.</td>
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<tr>
<td>Induction heating</td>
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</table>

What you need to do

It is recommended that you refer to the full report for your specific welding processes. Review your welding risk assessment to ensure the risk control measures minimise exposure to EMF for the welder. Communicate the risk assessment findings to the people at risk.

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\(^2\) HSAS H&S Bulletin Electromagnetic Fields Directive and AURPO Guidance note on Non-Ionising Radiations in Research and Teaching (8 January 2014) (.pdf)