Safe Welding Operations — study guide

Welding joins metal with heat, electricity or flame — and it can burn, blind, shock or start a fire. This guide covers the methods, the hazards, the controls and welding in enclosed spaces.[1][2]

What welding is and its methods

Welding is a fabrication process that joins materials, usually metals or thermoplastics, by causing coalescence — often by melting the work-pieces and adding a filler material to form a weld pool that cools into a strong joint. Methods of welding include **gas metal arc welding**, **shielded metal arc welding** and **gas tungsten arc welding**. The most common shipboard methods are **arc welding**, **gas welding** and **gas cutting**.

Hazards

Welding hazards include burns, cuts and abrasions, and electric shock. **Fire** is a major risk of most types of welding. Long-term risks include cancer and neurological problems, and hand-arm vibration syndrome (HAVS). Common causes of weld failures are overload, joint design and metallurgical failure; weld faults can be avoided by following safety procedures and considering all aspects of the welding operation.

PPE and eye protection

PPE for welding includes insulated gloves, rubber-soled safety shoes, and eye and face protection. Eye protection options are a **welding helmet or mask with a filter** or a **handheld welding shield with a filter**.

Before you start

Before starting a welding job: remove flammable materials and objects; have welding equipment and tools checked by a competent person; and secure a **hot work permit** and any other required permits. The designated safety officer and the Master are responsible for determining whether a welding job is necessary, justified and possible to do safely.

Controlling the risks

- **Electrical controls**: always use the correct current and voltage for the equipment, keep the area and clothing dry, and connect the welding equipment properly to complete the circuit.
- **Fire controls**: keep an appropriate fire extinguisher to hand, check the site frequently after work finishes in case of delayed fires, and set a fire watch for the duration of the work.
- **Ventilation**: if welding must be carried out in a space without adequate ventilation,

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use external fume extraction or a respirator.

Welding in enclosed spaces

Risks of welding in enclosed spaces include limited openings for entry and exit, restricted movement due to tight spaces, and poor ventilation resulting in dangerous atmospheres. Controls include using specialised PPE such as a harness or respirator, checking ventilation periodically during the operation, setting up adequate ventilation where possible, and testing the atmosphere for oxygen and gas levels before entry.

Key facts to remember

- Welding joins materials by coalescence; methods include gas metal arc, shielded metal arc and gas tungsten arc.
- Hazards: burns, cuts/abrasions, electric shock, fire; long-term: cancer, neurological problems, HAVS.
- PPE: insulated gloves, rubber-soled safety shoes, eye/face protection (helmet or handheld shield with filter).
- Before starting: remove flammables, have equipment checked by a competent person, secure a hot work permit.
- Electrical: correct current/voltage, keep dry, complete the circuit. Fire: extinguisher, post-work checks, fire watch.
- Poor ventilation: external fume extraction or respirator.
- Enclosed space: specialised PPE, periodic ventilation checks, test atmosphere for oxygen/gas before entry.

Sources

1. Code of Safe Working Practices for Merchant Seafarers (COSWP) — Maritime and Coastguard Agency (MCA) (hot work and welding).
2. ISM Code (SOLAS Chapter IX) and hot work permit procedures — control of high-risk operations.