

Apply core land-based engineering principles: thermal joining processes

Overview

This standard covers the application of core land-based engineering principles: thermal joining processes. It includes high and low temperature - fusion and non-fusion techniques used in repair and manufacture.

This does not cover the repair of safety critical components.

This standard is for those who work in land-based engineering and is appropriate for persons working under supervision.

Note: due to current regulations an approved electrician should be involved when working with mains electricity.

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Performance criteria

You must be able to:

1. identify materials and their suitability for either welding, bronze welding or soldering processes
2. prepare the workplace and equipment to carry out a **thermal joining** process including PPE (Personal Protective Equipment)
3. prepare materials and joints to comply with specifications
4. apply core land-based engineering principles and techniques to carry out thermal joining tasks
5. join a range of ferrous materials producing joints of the required specification
6. identify **faults** in welded, bronze welded and soldered joints using appropriate inspection techniques
7. **inspect and maintain equipment** and change consumables used in joining processes
8. shut down equipment to a safe condition on completion of thermal joining activities

Knowledge and understanding

You need to know and understand:

1. how to identify ferrous and non-ferrous materials and their respective joining characteristics (similar and dissimilar), when using thermal joining processes
2. preparation and joining procedures for joints to include butt, lap, fillet, single and multi-run joints, tacking, positioning and clamping
3. principles and techniques for joining ferrous or non-ferrous materials using gas or electric welding and soldering methods
4. how to control distortion and weld defects
5. how to select, prepare and set the relevant **gas** or **electric equipment** to carry out thermal joining processes to include setting pressures, and amperage, voltages, selecting electrode sizes, nozzle sizes and selection of fluxes for bronze welding and soldering
6. the appropriate PPE (Personal Protective Equipment) for the task being undertaken
7. the properties and purpose of flux
8. the function of welding slag and its removal
9. the range of techniques necessary to prepare material prior to thermal joining
10. how to detect and correctly identify faults and their causes in welded, bronze welded and soldered joints using visual inspection, non-destruction and destruction procedures, leak testing
11. the precautions required when engaging in a thermal joining process to avoid, in particular, fumes, explosions, fire, sharp edges, airborne debris and personal injury

Glossary

electric equipment - includes manual metal arc (MMA), metal inert gas (MIG), metal active gas (MAG), tungsten inert gas (TIG) and soldering equipment

faults - e.g. undercutting, slag traps, inadequate penetration, cracking

gas equipment - includes Oxy-acetylene

inspect and maintain equipment - e.g. clean gas nozzles, change gas cylinders and welding wire spools

thermal joining includes welding and non-fusion joining, e.g. soldering and brazing.

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Developed by	Lantra
Version Number	2
Date Approved	December 2015
Indicative Review Date	December 2020
Validity	Current
Status	Original
Originating Organisation	Lantra
Original URN	LANLEO9
Relevant Occupations	Land-based Engineering
Suite	Land-based Engineering Operations
Keywords	engineering; principles; welding; soldering; brazing; land-based; equipment; machinery