LANLEO9

Apply core land-based engineering principles: thermal joining processes

Overview

This standard covers the application of core land-based engineering principles, specifically thermal joining processes. These include high and low temperature, fusion and non-fusion techniques, which are used in repair and manufacture.

This does not cover the repair of safety critical components.

When working with machinery or equipment you should be trained and hold current certification, where required, in accordance with the relevant legislation.

When working on high voltage (hazardous voltage/HaV) electric vehicles, de-energising must be done by a person who has been trained in accordance with the manufacturer's procedures.

This standard is for those who work in land-based engineering under supervision.

Note - in accordance with current regulations, mains electricity work must be carried out by a competent person, usually an electrician.

Performance criteria

You must be able to:

1. be aware of the hazards and risks associated with the activity and the location where it is to be carried out
2. be aware of the potential environmental impact associated with the activity and the ways in which this can be controlled
3. select and wear suitable clothing and personal protective equipment (PPE) and confirm that a suitable ventilation system is used in accordance with health and safety requirements
4. select, prepare, use, maintain and store the tools and equipment required to carry out the activity, in accordance with the legal requirements, manufacturer's instructions and company practices
5. identify the materials to be joined and their suitability for thermal joining, by either welding, bronze welding or soldering processes
6. prepare the workplace and equipment to carry out a thermal joining process
7. prepare the materials and joints in accordance with the thermal joining process being used
8. apply core land-based engineering principles and techniques to carry out thermal joining, producing joints of the required specification
9. identify faults in welded, bronze welded and soldered joints using relevant inspection techniques
10. inspect and maintain the equipment used to carry out thermal joining and change the consumables used in joining processes
11. shut down equipment and leave it in a safe condition on completion of the thermal joining activities
12. leave the workplace in a safe condition following completion of the activity
13. deal with the different types of waste, including hazardous and non-hazardous, caused by the activity, in accordance with instructions and the relevant legal and environmental requirements
14. complete records as required in accordance with company instructions

Knowledge and understanding

You need to know and understand:

1. the hazards and risks associated with thermal joining, including fumes, explosions, fire, sharp edges, airborne debris and personal injury, and how to protect against them
2. the type of clothing and personal protective equipment (PPE) suitable for the activity and the importance of a suitable ventilation system
3. the tools and equipment required to carry out the activity and how to select, prepare, use, maintain and store these safely and correctly, in accordance with the manufacturer's instructions and company practices
4. how to identify ferrous and non-ferrous materials and their respective thermal joining processes
5. the characteristics of different thermal joining processes
6. the range of techniques necessary to prepare material prior to thermal joining
7. the preparation and joining procedures for joints
8. the principles and techniques for joining ferrous or non-ferrous materials using gas or electric welding and soldering methods
9. how to control distortion and weld defects
10. how to select, prepare and set the relevant gas or electric equipment to carry out thermal joining processes
11. the properties and purpose of flux
12. the function of welding slag and its removal
13. 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 and leak testing
14. the importance of leaving the workplace in a safe condition following completion of the activity
15. how to deal with the different types of waste, including hazardous and non-hazardous, caused by the activity, in accordance with instructions and the relevant legal and environmental requirements
16. the potential impact that the activity could have on the environment and the ways in which this can be controlled
17. the records that need to be completed and the company procedure for these

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
- joints include butt, lap, fillet, single, multi-run joints, tacking, positioning and clamping
- preparation of equipment including setting pressures, and amperage, voltages, selecting electrode sizes, nozzle sizes and selection of fluxes for bronze welding and soldering
- thermal joining includes welding and non-fusion joining, e.g. soldering and brazing

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Developed by	Lantra
Version Number	3
Date Approved	31 Jan 2022
Indicative Review Date	31 Jan 2027
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