

| | | | |
|--------------|--------------------------------------|----------------|-----------|
| Title | Repair printed circuit boards | | |
| Level | 4 | Credits | 20 |

| | |
|----------------|--|
| Purpose | <p>This unit standard covers repair of printed circuit boards (PCB) in the electronics industry, including through-hole and surface mount technologies. Repairs involve replacement of passive and active components as well as structural repairs to the board. Diagnosis of faulty components is not covered.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> –set up the printed circuit board repair environment; –remove components from printed circuit boards; –repair printed circuit board structure; and –replace components on printed circuit boards. |
|----------------|--|

| | |
|-----------------------|---|
| Classification | Electronic Engineering > Electronic Manufacturing |
|-----------------------|---|

| | |
|------------------------|----------|
| Available grade | Achieved |
|------------------------|----------|

Guidance Information

- 1 Definitions
 - surface mount devices (SMD)* – components that are bonded directly to the circuit board.
 - through-hole (or leaded) components* – components that use leads or wires for their connection to a printed circuit board.

- 2 Range
 - a printed circuit board types – two of the following types – single sided, double sided, plated through-hole, multi-layer boards;
 - b components – both conventional and SMD types; must include variety of components, including integrated circuits.
 - c PCB structure repairs include – component replacement, track or pad replacement, plated through-hole or multi-layer interconnection repairs.

- 3 References
 - Health and Safety in Employment Act 1992;
 - Hazardous Substances and New Organisms Act 1996;
 - ANSI/IPC J-STD- 001D, *Requirements for Soldered Electrical and Electronic Assemblies*, February 2005, published jointly by IPC – Association Connecting Electronics Industries and the Electronic Industries Alliance;
 - IPC-7711B/7721B, *Rework, Modification and Repair of Electronic Assemblies*, November 2007, published by IPC – Association Connecting Electronics Industries;
 - IPC-A-610D, *Acceptability of Electronic Assemblies*, 2005, published by IPC – Association Connecting Electronics Industries.

IPC-S-816, *SMT Process Guideline and Checklist*, July 1993, published by IPC – Association Connecting Electronics Industries.

- 4 The following apply to all outcomes of this unit standard:
- a all activities are to be completed and reported within agreed timeframes;
 - b all work practices must meet worksite's documented quality management requirements;
 - c all activities must comply with policies, procedures and requirements of the enterprises involved; and any relevant legislative and/or regulatory requirements, which include, but are not limited to, the Health and Safety in Employment Act 1992 and the Hazardous Substances and New Organisms Act 1996.

Outcomes and performance criteria

Outcome 1

Set up the printed circuit board repair environment.

Performance criteria

- 1.1 The workplace layout conforms to enterprise safety standards and presents no uncontrolled hazards to any person.
- 1.2 The selected equipment, settings, and materials are suitable for the type of repair.
- Range equipment – thermal capacity, tip shape and size;
settings – temperature, gas flows, solder removal;
materials – flux, cleaning materials, paste.
- 1.3 Measures to prevent damage from electrostatic discharge are applied.

Outcome 2

Remove components from printed circuit boards.

Performance criteria

- 2.1 The removal process causes no damage to the printed circuit board or adjacent components.

Outcome 3

Repair printed circuit board structure.

Performance criteria

- 3.1 Repair materials and process selection are relevant to the given repair requirement.
- Range requirement includes – pad or track replacement, plated through-hole replacement, board layer interconnection replacement.

3.2 The repair complies with PCB repair standards.

Range IPC standards, or equivalent, for – repair physical appearance, mechanical strength, electrical properties.

Outcome 4

Replace components on printed circuit boards.

Performance criteria

4.1 Placement and soldering of components does not damage the printed circuit board, the components being replaced, or adjacent components.

Range damage – physical, heat, electrostatic discharge (ESD).

4.2 The repaired board meets required PCB quality standards.

Range IPC standards, or equivalent, for – appearance, mechanical properties, electrical properties.

This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

| Process | Version | Date | Last Date for Assessment |
|-----------------------|---------|------------------|--------------------------|
| Registration | 1 | 24 February 1998 | 31 December 2021 |
| Review | 2 | 28 June 1999 | 31 December 2021 |
| Review | 3 | 23 November 2003 | 31 December 2021 |
| Rollover and Revision | 4 | 19 March 2010 | 31 December 2021 |
| Review | 5 | 26 July 2018 | 31 December 2021 |

| | |
|--|------|
| Consent and Moderation Requirements (CMR) reference | 0003 |
|--|------|

This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.