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| Title | Demonstrate advanced knowledge of electrical circuit protection | | |
| Level | 5 | Credits | 3 |

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| Purpose | <p>This unit standard and is intended for use in the training and assessment of electricians beyond trade level. It covers theory related to the protection of electrical circuits, at a level more advanced than the requirements for the National Certificate in Electrical Engineering (Electrician for Registration) (Level 4) [Ref: 1195].</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> – demonstrate advanced knowledge of excess current protection devices; and – demonstrate knowledge of circuit protection devices for other than excess current protection. |
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| Classification | Electrical Engineering > Electrical Installation and Maintenance |
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| Available grade | Achieved |
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Guidance Information

- 1 Recommended skills and knowledge:
National Certificate in Electrical Engineering (Electrician for Registration) (Level 4) [Ref: 1195] or equivalent trade qualification for electricians.
- 2 This unit standard has been developed for learning and assessment off-job.
- 3 Definitions
HRC – high rupturing capacity.
mcb – miniature circuit breakers.
MCCB – moulded case circuit breakers.
RCBO – residual current operated circuit breaker with overcurrent protection.
RCCB – residual current operated circuit breaker.
UPS – uninterrupted power supply.

Outcomes and performance criteria

Outcome 1

Demonstrate advanced knowledge of excess current protection devices.

Performance criteria

- 1.1 Terms associated with excess current protection devices are explained.
- Range pre-arcing time, arcing time, operating or total clearance time, cut-off current, rated values, fusing factor, fusing factor classes, utilisation categories, breaking capacity, category of duty, close excess current protection, coarse excess current protection, discrimination, backup protection.
- 1.2 Features, operation, applications, and selection of HRC fuses or HRC disconnects are identified and typical current versus time characteristics sketched. Replacement comparisons are stated between fusing factors and utilisation categories.
- 1.3 Electrical features, applications, operation, and selection of mcb, RCBO, and MCCB are compared, and the current versus time characteristics are sketched.
- 1.4 Practical methods for achieving discrimination between HRC fuses are outlined.
- 1.5 Practical methods for achieving discrimination between circuit breakers are outlined.
- 1.6 Prospective short circuit current and fault current level of typical commercial or industrial situations are calculated.
- Range calculation of – one prospective short circuit current, one fault current level.

Outcome 2

Demonstrate knowledge of circuit protection devices for other than excess current protection.

Performance criteria

- 2.1 Effects of under voltage to an installation are explained.
- Range motors, lighting, heating.
- 2.2 Operation of an under voltage protection device is described.
- Range one of – solid state relay, moving iron attraction relay, no-volt protection device for a motor.
- 2.3 Effects of over voltage to an installation are explained.
- Range motors, luminaries, and insulation.
- 2.4 Use of surge diverters and UPSs to protect components and systems from voltage surges is explained with reference to device characteristics and typical leakage currents.

- 2.5 Use of thermistors with a positive temperature characteristic to protect machine windings from overheating is described with reference to device characteristics, operation, and place of connection.
- 2.6 Use of a thermal device to protect a three-phase motor from single-phasing is described with reference to device characteristics, operation, and place of connection.
- 2.7 Protection from phase reversal is described with reference to one type of protection device, its operation, and connection.
- 2.8 Installation and use of RCCBs and RCBOs to provide addition protection against leakage currents in specialised applications is explained.

Range medical electrical locations, mining, construction and demolition sites, marinas, caravan parks, carnival and fair grounds, and locations where even minor leakages introduce significant hazards to the operating environment and consequential risk to personal safety;
evidence of two is required.

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| Planned review date | 31 December 2022 |
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Status information and last date for assessment for superseded versions

| Process | Version | Date | Last Date for Assessment |
|-----------------------|---------|------------------|--------------------------|
| Registration | 1 | 26 February 2002 | 31 December 2013 |
| Review | 2 | 19 June 2009 | N/A |
| Rollover and Revision | 3 | 15 March 2012 | N/A |
| Revision | 4 | 15 January 2014 | N/A |
| Rollover and Revision | 5 | 28 January 2021 | N/A |

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| Consent and Moderation Requirements (CMR) reference | 0003 |
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Comments on this unit standard

Please contact The Skills Organisation reviewcomments@skills.org.nz if you wish to suggest changes to the content of this unit standard.