

Title	Overhaul d.c. rotating machines and control equipment		
Level	4	Credits	5

Purpose	<p>This unit standard covers the overhauling of direct current (d.c.) electric motors and generators, and associated control equipment such as starters and speed controllers, and is for people wishing to qualify in the electrical industry as motor rewinders or electricians.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> – prepare d.c. rotating machines for overhaul; – dismantle d.c. rotating machines; – inspect d.c. rotating machines; – repair and replace defective components of d.c. rotating machines; – re-assemble d.c. rotating machines; – overhaul control equipment for d.c. rotating machines; – re-install and re-commission d.c. rotating machines.
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Classification	Electrical Engineering > Electrical Machines
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Available grade	Achieved
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Guidance Information

- 1 This unit standard has been developed for learning and assessment on-job.
- 2 Achievement of this unit standard does not by itself imply that trainees may legally perform prescribed electrical work in their own right. Until they are registered and licensed under the Electricity Act 1992, trainees are assisting, and must work under the supervision of a Supervisor of Electrical Work when carrying out prescribed electrical work. If the prescribed electrical work in question is carried out for reward the Supervisor of Electrical Work must hold a valid practising licence.
- 3 References
 Electricity Act 1992;
 Electricity (Safety) Regulations 2010;
 Health and Safety at Work Act 2015;
 AS/NZS 3000:2007, *Electrical installations (known as the Australian/New Zealand Wiring Rules)*, including Amendment 1;
 AS/NZS 3017:2007, *Electrical installations – Verification guidelines*;
 and all subsequent amendments and replacements.

4 Definitions

Current regulations and standards – refers to the requirements of the above references.

Machine specifications – the manufacturers' specifications for the machine, but may also include data generated at previous overhauls. In situations where neither of these are available, general guidelines contained in industry handbooks may be used instead.

Repair – includes activities such as reconditioning commutators and bedding-in brushes.

Safe and sound practice – relating to the installation of electrical equipment is defined in AS/NZS 3000:2007.

5 Assessment

Demonstration of *safe working practices* and installation in accordance with *safe and sound practice* are essential components of assessment against this unit standard.

The number and type of machines chosen are left to the discretion of the assessor, but must be sufficient to assess competence against all outcomes of the unit standard.

Outcomes and performance criteria

Outcome 1

Prepare d.c. rotating machines for overhaul.

Performance criteria

1.1 Preparation establishes the reason for the overhaul.

Range reasons may include but are not limited to – planned maintenance, failure, fault report, service tag, customer instruction, re-deployment of the machines.

1.2 Preparation includes machine isolation, tagging, and disconnection from the supply and control circuits, in accordance with current regulations and standards.

1.3 Preparation includes establishment of a clean and dry workplace in which to do the overhaul.

1.4 Preparation includes moving the machines to the workplace without damage to the machines, other equipment, or surroundings.

Outcome 2

Dismantle d.c. rotating machines.

Performance criteria

2.1 Dismantling includes systematic marking of positions of components to ensure the drive and non-drive end bells are replaced on the correct stator ends on re-assembly, and to ensure grease channels are aligned.

- 2.2 Dismantling includes recording of component clearances and comparison with machine specifications.
- 2.3 Dismantling is in the order recommended by machine specifications.

Outcome 3

Inspect d.c. rotating machines.

Performance criteria

- 3.1 Inspection includes visual inspection for damage.
- 3.2 Inspection includes cleaning of components.
- 3.3 Inspection includes identification of worn, deteriorated, or damaged components, in accordance with machine specifications.

Outcome 4

Repair and replace defective components of d.c. rotating machines.

Performance criteria

- 4.1 Each defective component is assessed to determine whether it should be repaired or replaced.
- Range the assessment takes into account – availability of replacements, cost, time, manufacturers' recommendations, customer's or supervisor's instructions.
- 4.2 Repairs and replacements restore the machines to as close to original condition as possible, given the age and condition of the machines.
- 4.3 Repaired and replaced components are tested to verify operation against machine specifications.

Outcome 5

Re-assemble d.c. rotating machines.

Performance criteria

- 5.1 Order of re-assembly is in accordance with machine specifications.
- 5.2 Re-assembly includes alignment and secure fastening of components without distortion.
- 5.3 Re-assembly includes setting of clearances and making adjustments in accordance with machine specifications.

- 5.4 Re-assembly includes lubrication of bearings in accordance with machine specifications.

Outcome 6

Overhaul control equipment for d.c. rotating machines.

Range control equipment includes starters and speed controllers; the nature of the control equipment will be determined by the d.c. machines presented for evidence.

Performance criteria

- 6.1 Overhaul includes inspection and testing of control equipment and associated components and wiring, in accordance with control equipment specifications and job instructions.
- 6.2 Faulty components and/or wiring are located using a logical technique for analysing symptoms and making electrical measurements where necessary.
- 6.3 Overhaul includes repair and/or replacement of faulty components and wiring in accordance with control equipment specifications.
- 6.4 Overhaul includes testing to confirm that all requirements of current regulations and standards have been met, and that the equipment is safe to reconnect.
- 6.5 Overhaul includes testing and adjustments to restore the equipment to operational condition, in accordance with specifications.
- 6.6 Documentation is completed in accordance with company requirements.

Outcome 7

Re-install and re-commission d.c. rotating machines.

Performance criteria

- 7.1 Re-installation is without damage to the machines and its environment, and is in accordance with machine specifications.
- 7.2 Testing confirms that all requirements of current regulations and standards have been met, and that the machines are safe to reconnect.
- 7.3 Re-commissioning includes tests, adjustments, and confirmation of operation of control equipment in accordance with machine specifications.
- 7.4 Re-commissioning verifies off-load and on-load operation of the machines against machine specifications and records of previous tests.

Range direction of rotation, vibration, temperature rise, current draw.

- 7.5 Test results are documented in accordance with current regulations and standards, and industry standards.

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	23 April 1996	31 December 2013
Review	2	28 June 1999	31 December 2013
Review	3	26 May 2005	31 December 2013
Review	4	22 August 2008	31 December 2024
Rollover and Revision	5	15 March 2012	31 December 2024
Revision	6	15 January 2014	31 December 2024
Review	7	22 August 2019	31 December 2024

Consent and Moderation Requirements (CMR) reference

0003

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