Title	**Demonstrate knowledge of standby power plant**		
Level	**5**	**Credits**	**4**

Purpose	This unit standard is intended for use in the training and assessment of electricians beyond trade level. It covers theory of standby power plant and its use to maintain the supply of electric power in industrial or commercial situations when the mains supply fails. People credited with this unit standard are able to demonstrate knowledge of: – standby generator sets – the application of standby generator sets – the control systems of standby generator sets – no-break standby plant – supply line disturbances – emergency lighting systems.

Classification	Electrical Engineering > Electrical Installation and Maintenance

Available grade	Achieved

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
AC – alternating current.
DC – direct current.
kW – kilowatt.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of standby generator sets.

Performance criteria

1.1 Construction of a typical standby generator set is described with reference to major functional components and starting methods.

Range starting methods may include but are not limited to – hand-crank, auxiliary engine, electrical starter, compressed-air starter, hydraulic, cartridge;
evidence of four is required.

1.2 Routine maintenance checks are identified for a typical standby generator set.

Range fuel, oil, and water levels; oil and water hoses; fan and drive belts; shaft couplings; brushgear; batteries and leads; instruments; indication lights; fuel, oil, coolant, and exhaust system leaks; fuel; pipelines; clean; start and run.
evidence of eight is required.

Outcome 2

Demonstrate knowledge of the application of standby generator sets.

Performance criteria

2.1 Electrical loads are ranked by priority of restoration.

Range no-break loads (uninterruptible essential loads), first essential loads (interruptible essential loads, 10 seconds), second essential loads (manual start adequate), non-essential loads.

2.2 Standby plant requirements are identified for five applications.

Range standby plant requirements – no-break, first essential, second essential;
applications – hospitals, airports, defence establishments, chemical plants, telephone networks, public buildings, banking and data centres, cold storage, electrical supply company control centres, computers and other highly-sensitive loads.

Outcome 3

Demonstrate knowledge of the control systems of standby generator sets.

Performance criteria

3.1 Control systems of typical standby generator sets are described with reference to starting, engine control, and alternator control and protection.

Range excitation control, voltage regulation, phase failure, voltage sensing, speed governor protection, manual-start, auto-start, automatic synchroniser, delay-start, delay-stop.

Outcome 4

Demonstrate knowledge of no-break standby plant.

Performance criteria

4.1 Operation of a no-break rotary set is described with the aid of a block diagram of major functional components, sketched by the candidate.

Range one of – rectifier, DC motor-alternator set; three-machine set comprising engine, AC motor, flywheel, and alternator on a common shaft.

4.2 Uninterruptible power supplies are classified by their configurations, and a block diagram of each configuration is sketched by the candidate.

Range single-module, single-module with bypass, three-module parallel-redundant, two-module with standby alternator.

4.3 Operation of a typical uninterruptible power system static inverter is explained with reference to a provided circuit diagram.

Range reference should be made to – single-phase; three-phase; thyristor and constant-voltage transformer; transistor and filter network; power ratings to 10 kW, to 100 kW, above 100 kW.

Outcome 5

Demonstrate knowledge of supply line disturbances.

Performance criteria

5.1 Supply line disturbances are defined and typical waveforms sketched.

Range disturbances – brownouts, transients, electrical noise, line surge, blackouts.

5.2 Electrical noise suppression methods are explained with the aid of sketches, and with reference to the components used.

Range shunt capacitors, series chokes, combination units, constant-voltage transformer.

Outcome 6

Demonstrate knowledge of emergency lighting systems.

Performance criteria

6.1 Operating principles of emergency lighting systems are explained with the aid of block diagrams showing major functional components and their interconnections.

Range systems – non-maintained mode, maintained mode, sustained mode; luminaires with battery packs and chargers for remote emergency lighting of building exit signs.

6.2 Characteristics and requirements of batteries for use in emergency lighting are identified.

Range battery type, battery capacity, battery rating, battery charger, maintenance.

6.3 Size of emergency lighting battery supply is calculated for given data.

Range data from – table of battery ampere-hour capacities, voltage, luminaire wattage, number of luminaires, load current, operating time.

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	26 February 2002	31 December 2013
Review	2	19 June 2009	31 December 2025
Rollover and Revision	3	15 March 2012	31 December 2025
Revision	4	15 January 2014	31 December 2025
Rollover and Revision	5	28 January 2021	31 December 2025
Review	6	27 April 2023	31 December 2025

Consent and Moderation Requirements (CMR) reference	0003

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