

Australian/New Zealand Standard

Demand response capabilities and supporting technologies for electrical products

**Part 1: Demand response framework
and requirements for demand response
enabling devices (DREDs)**



AS/NZS 4755.1:2017



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CSIRO
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Australian/New Zealand Standard

Demand response capabilities and supporting technologies for electrical products

Part 1: Demand response framework and requirements for demand response enabling devices (DREDs)

Originated as AS 4755—2007.
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-054, Remote Demand Management of Electrical Products, to supersede AS 4755—2007, *Framework for demand response capabilities and supporting technologies for electrical products*.

This Standard, together with the other parts of AS/NZS 4755, is intended to define the nomenclature, architecture and operational instructions for systems that can be used to remotely control electrical products. At the time of publication of this Part, the AS/NZS 4755 series comprises the following:

- 4755.1 Part 1: Framework for demand response capabilities and requirements for demand response enabling devices (DREDs)
- 4755.3.1 Part 3.1: Interaction of demand response enabling devices and electrical products—Operational instructions and connections for air conditioners
- 4755.3.2 Part 3.2: Interaction of demand response enabling devices and electrical products—Operational instructions and connections for devices controlling swimming pool pump-units
- 4755.3.3 Part 3.3: Interaction of demand response enabling devices and electrical products—Operational instructions and connections for electric and electric-booster water heaters
- 4755.3.4 Part 3.4: Interaction of demand response enabling devices and electrical products—Operational instructions and connections for grid-connected charge/discharge controllers for electric vehicles (EVSEs) [proposed new Standard]
- 4755.3.5 Part 3.5: Interaction of demand response enabling devices and electrical products—Operational instructions and connections for grid-connected electrical energy storage (EES) systems

Note that there is currently no Part 2.

The AS/NZS 4755 Framework is also relevant to AS/NZS 4777, *Grid connection of energy systems via inverters*.

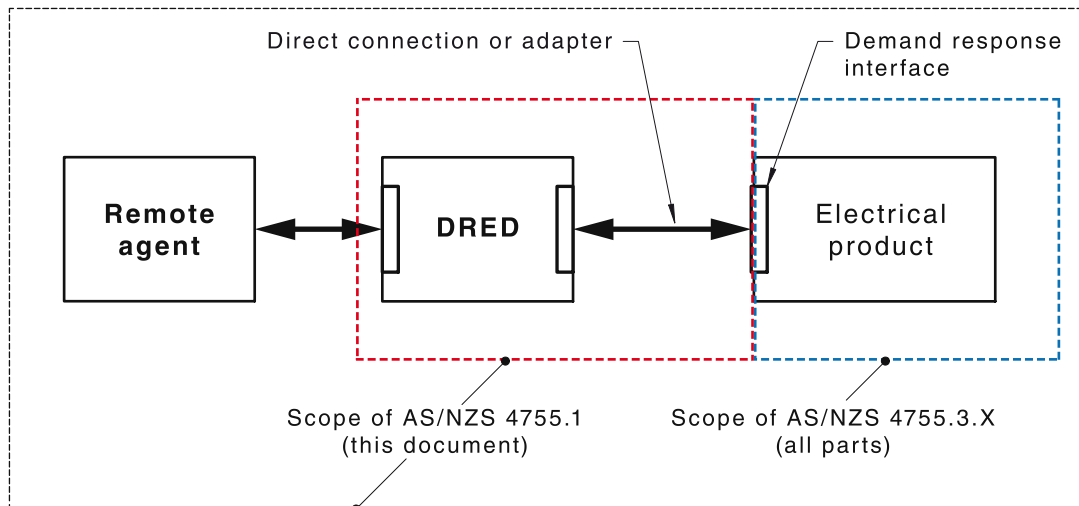
This Standard is intended to support demand response programs which optimize the operation of the electricity supply system and allow the efficient planning and use of capital equipment, while minimizing the risks to the comfort and amenity of the users of electrical products.

Demand response may be achieved in ways other than the AS/NZS 4755 framework. However, this Standard only covers the AS/NZS 4755 framework.

The following figure depicts the overall structure of AS/NZS 4755 and the place of AS/NZS 4755.1 within that structure.

All the information required to manufacture an electrical product which complies with AS/NZS 4755, Parts 3.1, 3.2, 3.3, 3.4 or 3.5 (collectively termed Part 3.X) is contained in the relevant Part, and it is not necessary to refer to AS/NZS 4755.1. All the information required to manufacture a Demand Response Enabling Device (DRED) which complies with AS/NZS 4755.1 is contained in this document, and it is not necessary to refer to AS/NZS 4755.3.X. However, remote agents and other prospective users and managers of the demand response framework described in Section 2 of this document should familiarize themselves with all Parts of AS/NZS 4755.

AS/NZS 4755.1 does not cover all aspects of construction and performance of the Demand Response Enable Device (DRED), which may be subject to other Standards.



COVERAGE OF PARTS OF AS/NZS 4755

This Standard—

- (a) creates a framework that will allow off-the-shelf equipment, communications technologies and electrical products to be integrated and adapted so that demand management solutions may be developed and deployed in a timely and economical fashion;
- (b) specifies the minimum functionality of a DRED;
- (c) describes additional, optional functionalities which may be incorporated into a DRED; and
- (d) describes various means of communicating with a remote agent which enables DREDs to be designated as distinct classes. For example, a DRED meeting the requirements of Appendix B of this Standard is designated a Class B DRED, and a DRED meeting the requirements of Appendix C is designated a Class C DRED. The appendices are normative for DREDs which are designated as belonging to a specific class. Further appendices, which would create additional classes of DREDs may be added in future editions of this Standard.

A supplier who wishes to build a DRED that conforms to this Standard (AS/NZS 4755.1) but not with Appendix B or C may do so. However, the supplier would have to be able to demonstrate the ability of the DRED to receive commands from a remote agent via the communications channel(s) of which it is claimed to be capable.

The terms 'normative' and 'informative' are used in a Standard to define the application of the appendices or annexes to which they apply. A 'normative' appendix or annex is an integral part of a Standard, whereas an 'informative' appendix or annex is only for information and guidance.

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STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard**Demand response capabilities and supporting technologies for electrical products****Part 1: Demand response framework and requirements for demand response enabling devices (DREDs)**

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies a demand response framework, which consists of a DRED complying with AS/NZS 4755.1 and one or more electrical products complying with the relevant parts of AS/NZS 4755.3.

This Standard also specifies the following:

- (a) Minimum physical requirements for a DRED.
- (b) Minimum levels of functionality for a DRED.
- (c) Optional capabilities and functionalities.
- (d) Various means of communicating with a remote agent which allow a DRED to be designated as a specific class.

NOTE: For example, a DRED that complies with the means of communication specified in Appendix B is designated a Class B DRED, and a DRED that complies with the means of communication specified in Appendix C is designated a Class C DRED.

- (e) Means of connecting a DRED to the demand response interface(s) on one or more electrical products meeting the requirements of AS/NZS 4755.3.X.

NOTE: AS/NZS 4755.3.1, AS/NZS 4755.3.2, AS/NZS 4755.3.3, AS/NZS 4755.3.4 and AS/NZS 4755.3.5 are collectively called AS/NZS 4755.3.X in this document.

- (f) Labelling and marking requirements for a DRED.

The Standard sets out an approach to the verification and testing of DRED capabilities.

This Standard does not—

- (i) cover products with functions similar to those of DREDs that may interact with or control the operation of categories of electrical products not covered by AS/NZS 4755.3.X;
- (ii) specify or limit the means of communication between the remote agent and the DRED (other than DREDs of a class covered by an appendix);
- (iii) specify or limit the form of connection or communication between parts of multi-part DREDs; or
- (iv) limit additional capabilities that the DRED may have beyond those specified, provided such capabilities do not conflict with the requirements of this Standard.

Other statutory or regulatory requirements may be applicable to the product(s) that fall within the scope of this Standard. It is the manufacturer's, importer's or distributor's responsibility (as appropriate) to ensure that products comply with such requirements.

1.2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS/NZS

- | | |
|----------|--|
| 3000 | Electrical installations (known as the Australian/New Zealand Wiring Rules) |
| 4755 | Demand response capabilities and supporting technologies for electrical products |
| 4755.3.1 | Part 3.1: Interaction of demand response enabling devices and electrical products—Operational instructions and connections for air conditioners |
| 4755.3.2 | Part 3.2: Interaction of demand response enabling devices and electrical products—Operational instructions and connections for devices controlling swimming pool pump-units |
| 4755.3.3 | Part 3.3: Interaction of demand response enabling devices and electrical products—Operational instructions and connections for electric and electric-boosted water heaters |
| 4755.3.4 | Part 3.4: Interaction of demand response enabling devices and electrical products—Operational instructions and connections for grid-connected charge/discharge controllers for electric vehicles (EVSEs) [proposed new Standard] |
| 4755.3.5 | Part 3.5: Interaction of demand response enabling devices and electrical products—Operational instructions and connections for grid-connected electrical energy storage (EES) systems |
| 4777 | Grid connection of energy systems via inverters |
| 4777.2 | Part 2: Inverter requirements |
| 60335 | Household and similar electrical appliances—Safety |
| 60335.1 | Part 1: General requirements (IEC 60335-1 Ed. 4.2, MOD) |
| 62052 | Electricity metering equipment (ac)—General requirements, tests and test conditions |
| 62052.21 | Part 21: Tariff and load control equipment (IEC 62052-21, Ed.1.0 (2004) MOD) |
| 62054 | Electricity metering (ac)—Tariff and load control |
| 62054.11 | Part 11: Particular requirements for electronic ripple control receivers |
| ISO/IEC | |
| 8877 | Information technology—Telecommunications and information exchange between systems—Interface connector and contact assignments for ISDN Basic Access Interface located at reference points S and T |

1.3 DEFINITIONS

For the purpose of this standard the following definitions apply.

NOTE: Additional terms used in appendices may be defined in those appendices.

1.3.1 Activated

Condition of a DRED in which it has the capability to pass on operational instructions, as defined in Section 4 of this Standard.

1.3.2 Asserted

The condition of a mechanical switch when the switch contact is closed, or the condition of an electronic switch when the load current of the switch is turned on.

1.3.3 Authorized person

A person, other than the user, who is authorized by the remote agent, the supplier of the DRED or the supplier of the electrical product, to access, install or adjust parts or functions of the DRED or electrical product not accessible to the user.

1.3.4 Circumvention device

Any control, control device, software, component or part that alters the operating characteristics during any test procedure, resulting in measurements that are unrepresentative of how that product would perform under comparable conditions in normal operation.

1.3.5 Command

A package of information which originates from the remote agent and which provides instructions to the DRED, regarding the status of the DRED, the execution of Operational instructions and other matters.

1.3.6 Deactivated

Condition of a DRED in which it does not have the capability to pass on operational instructions.

1.3.7 Demand response (DR)

The automated alteration of an electrical product's mode of operation in response to an initiating signal originating from or defined by a remote agent.

1.3.8 Demand response capability

The ability of an electrical product to provide demand response, when connected to a DRED.

1.3.9 Demand response enabling device (DRED)

A device that provides the functionalities and capabilities to achieve demand response and that meets the requirements of this Standard.

1.3.10 Demand response event

The period between the initiation and termination of an operational instruction group.

1.3.11 Demand response interface

In relation to a DRED, the physical connections and associated functions that enable a DRED to issue operational instructions to an electrical product. In relation to an electrical product, the physical connections and associated functions that enable an electrical product to receive operational instructions from a DRED.

1.3.12 Demand response mode (DRM)

A mode of operation within specified conditions, constraints or parameters during a demand response event (see Table 3.1).

1.3.13 Electrical product

A system or device designed to be connected to the grid and to provide, or control the provision of, an energy service such as cooling, heating, motive power, energy generation or storage. Includes all components required for normal operation and that are generally supplied or installed with the product, including thermostats or user-operated remote controls.

NOTE: Examples of electrical products include air conditioners, water heaters, swimming pool pump-unit controllers, charge/discharge controllers for electric vehicles and stationary batteries and grid-connected inverter energy systems. An electrical product may be a set of linked elements which collectively provides an energy service at a given site, and which responds as a group to an OI, e.g. micro-inverters.

1.3.14 Extra low voltage

Voltage supplied from a source within the electrical product that does not exceed 50 V between conductors, and between conductors and earth, when the electrical product is supplied at rated voltage.

1.3.15 Multi-interface DRED

A DRED with more than one demand response interface.

1.3.16 Multi-part DRED

A DRED in which the demand response interface is physically separated from other parts of the DRED, or may be physically separated without affecting the functions and capabilities of the DRED.

NOTE: A DRED in which the demand response interface is linked to the rest of the DRED by wireless means is multi-part. A DRED with an attached interface cable is not multi-part.

1.3.17 Operational instruction (OI)

A signal instructing an electrical product to enter a specific demand response mode (see Table 3.1).

1.3.18 Operational instruction group (OI Group)

A set of one or more operational instructions intended for the one type of electrical product.

NOTE: An OI group can include concurrent OIs, for example, for an electrical energy storage system, OI 1 (do not charge) as well as OI 8 (discharge to grid if possible) and OI 6 (limit rate of discharge to 50% of a reference value).

1.3.19 Remote agent

A person, organization or entity, other than the user, who initiates demand response.

NOTES:

- 1 Examples include electricity distributor, electricity retailer, electricity system manager and demand response aggregator.
- 2 The remote agent will generally have a contractual relationship with the user in which the user gives prior consent for the remote agent to initiate demand response under agreed conditions.

1.3.20 Reset

An operation performed on a DRED that returns all configurable settings, records and logs to their default values.

1.3.21 RJ45 Connector

The common name for the 8P8C modular connector specified according to ISO/IEC 8877:1992 that is generally used to terminate communications cables.

1.3.22 Safety extra-low voltage (SELV)

As defined in AS/NZS 60335.1.

NOTE: There are differences between the definitions and requirements of SELV provided in AS/NZS 3000 (where SELV refers to separated extra-low voltage) and AS/NZS 60335.1 (where SELV refers to safety extra-low voltage).

1.3.23 Shall

Indicates that a statement is mandatory.

1.3.24 Should

Indicates a recommendation

1.3.25 Standby power

Standby power is the power consumed by a DRED at times other than during demand response events. Standby power does not include power used in communicating with a remote agent.

1.3.26 Switch

A device for making and breaking the connection in an electrical circuit.

NOTE: A switch may be electromechanical or solid-state.

1.3.27 User

A person or entity that normally regulates the operation of an electrical product.

1.3.28 User operation

Operation of an electrical product under user control, including operation via user-set timers, thermostat settings and other operating parameters. User operation includes off-modes, standby modes and other modes that may be set by the user directly or by pre-programming.

1.3.29 User over-ride

The capability for the user to terminate an operational instruction.