AS 4755.2:2025

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STANDARDS Australia

Demand response capabilities and supporting technologies for electrical products

Part 2: Demand response framework and requirements for communication between remote agents and electrical products



AS 4755.2:2025

This Australian Standard® was prepared by EL-054, Remote Demand Management of Electrical Products. It was approved on behalf of Standards Australia's Standards Development and Accreditation Committee on 09 December 2025.

This Standard was published on 19 December 2025.

The following are represented on Committee EL-054:

Airconditioning & Refrigeration Equipment Manufacturers Association of Australia
Australian Energy Council
Australian Energy Market Operator
Australian Industry Group
Australian Institute of Refrigeration Air Conditioning and Heating
Australian National University
Clean Energy Council
Consumer Electronics Suppliers Association
Consumers Federation of Australia
CSIRO
Department of Climate Change, Energy, the Environment and Water
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This Standard was issued for comment as DR AS 4755.2:2025

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ISBN: 978 1 76175 561 3

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First published as AS 4755.2:2025.

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How to read this Standard

This page explains the meaning of the language and structure of this Standard.

Refer to Standards Australia's Standardisation Guide 006 for more details about drafting rules.

Australian and Australian/New Zealand Standards are voluntary unless they are referenced in legislation or called up in contracts.

Requirements

To conform to a Standard, all requirements in the Standard need to be met.

A requirement is any statement in the Standard which uses the word "shall".

Recommendations, permissions and possibilities

The following words are commonly used in Standards, but statements using them do not have to be followed to conform to the Standard:

(a) "should" means that something is recommended.

(b) "may" means that something is permitted.

(c) "can" means that something is possible.

Structure of Standards

A Standard always has the following parts:

(i) The Preface states who developed the Standard, what the Standard is aiming to do, and how it relates to other documents.

(ii) The Scope states what the Standard is about, what it covers and what it does not cover.

(iii) The Normative references clause lists other documents that are referenced in the Standard as part of requirements.

(iv) The Terms and definitions clause defines important terms to help with understanding the Standard.

A Standard may also include other parts, such as the following:

(1) A normative appendix sets additional requirements that need to be conformed to.

(2) An informative appendix provides additional information or guidance. They usually do not contain requirements. If an informative appendix does contain requirements, the Standard will explain when those requirements apply.

(3) A Bibliography lists documents referenced in the Standard but not as part of requirements.

Many Standards include notes. Notes provide recommendations and/or guidance only. They never contain requirements.

Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-054, Remote Demand Management of Electrical Products.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this document as an Australian Standard rather than an Australian/New Zealand Standard.

This document forms part of the AS/NZS 4755 series that defines the nomenclature, architecture and operational instructions for remote control systems that are used with electrical appliances. A list of all parts in this series can be found in the Standards Australia online catalogue.

An objective of this document is to enable a remote agent to receive consistent demand responses to a given command, irrespective of whether an appliance paired with the remote agent meets the requirements of this document or another part of the AS/NZS 4755 series.

The terms “normative” and “informative” are used in Standards 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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Introduction

The AS/NZS 4755 framework supports demand response programs, in order to —

(a) optimize operation of the electricity supply system;

(b) allow efficient planning and use of capital equipment; and

(c) minimize risks to the comfort and amenity of appliance users.

Owners and users of appliances should decide whether to participate in demand response programs that permit a remote agent to modify the operation of the appliance. There can be vulnerable users and critical applications where use of the demand response capabilities of the appliance is not advisable.

There are two types of demand response systems within the AS/NZS 4755 framework. Both types of system are capable of receiving commands from a remote agent.

The first type of system comprises —

(i) an electrical product/appliance conforming to a relevant part of the AS/NZS 4755.3 series which has been interfaced with a DRED conforming to AS/NZS 4755.1; or

(ii) a grid interactive inverter energy system conforming to AS/NZS 4777.2 which has been interfaced with a DRED conforming to AS/NZS 4755.1.

The second type of system is described by this document.

An appliance can conform to both systems but can only be set to be managed by one system at a time.

NOTE Inverters conforming to AS/NZS 4777.2 can be capable of connecting to a DRED or can use an alternative pathway for demand response if a DRED is not present. The detailed requirements for inverters are covered in AS/NZS 4777.2, and this document refers to AS/NZS 4777.2 where relevant.

Appendices A, B and E are considered to be appliance specific appendices.

The demand response modes described in Appendices A, B, and E resemble the demand response modes in AS/NZS 4755.3.1, AS/NZS 4755.3.2 and AS/NZS 4755.3.5 respectively. Appendices C and D have been intentionally left blank to enable the inclusion of additional appliances in the future.

Appendices G and H are considered to be communications protocol appendices.

The interaction of this document with SA HB 218 and OpenADR are described in Appendices G and H respectively.

Demand response may be achieved in ways other than the AS/NZS 4755 framework (e.g. an air conditioner response mode in which the remote agent adjusts the thermostat settings). An appliance may also have other demand response modes not specified in this document.

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Demand response capabilities and supporting technologies for electrical products

Part 2: Demand response framework and requirements for communication between remote agents and electrical products

Section 1 Scope and general

1.1 Scope

This document sets out an architecture and requirements of an interface between electrical grid operation and demand response capable appliances.

NOTE 1 This typically applies to residential applications but is not limited to these applications.

NOTE 2 The architecture does not require the use of a demand response enabling device (DRED).

NOTE 3 Appliances may also have a physical demand response interface intended to connect with a DRED conforming to AS/NZS 4755.1.

This document specifies requirements relating to the following:

(a) Functionality of the demand response system including responses of appliances to operational instructions contained in demand response commands.

(b) Cybersecurity.

(c) System implementation.

(d) Labelling, marking and documentation requirements.

(e) Testing.

It also details how specified communications protocols shall be utilized to support the demand response system.

NOTE 4 The mapping of demand response capabilities to communication protocols are contained in Appendices G and H.

This document excludes the following:

(i) Demand response modes other than those described in Table 2.1.

(ii) Appliances that are only capable of receiving operational instructions via a DRED.

NOTE 5 These appliances are covered by AS/NZS 4755.3 (series).

(iii) Commercial and contractual arrangements.

1.2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document.

AS 5102.1, *Performance of household electrical appliances — Swimming pool pump-units (series)*

AS 5385, *Smart Energy Profile Application Protocol*

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AS/NZS 3823, *Performance of electrical appliances — Air conditioners and heat pumps (series)*

AS/NZS 4755.1, *Demand response capabilities and supporting technologies for electrical products, Part 1: Demand response framework and requirements for demand response enabling devices (DREDs)*

AS/NZS 4755.3, *Demand response capabilities and supporting technologies for electrical products (series)*

AS/NZS 4777.2, *Grid connection of energy systems via inverters, Part 2: Inverter requirements*

AS/NZS 60335.1, *Household and similar electrical appliances — Safety: Part 1, General requirements*

AS ETSI EN 303 645:2023, *CYBER; Cyber security for consumer Internet of Things: Baseline requirements*

SA HB 218, *Common Smart Inverter Profile — Australia with Test Procedures*

IEC 61968-9, *Application integration at electric utilities — System interfaces for distribution management — Part 9: Interfaces for meter reading and control*

IEC 62351-9, *Power systems management and associated information exchange — Data and communications security — Part 9: Cyber security key management for power system equipment*

IEC 62746-10-1:2018, *Systems interface between customer energy management system and the power management system — Part 10-1: Open automated demand response*

AHRI 1380:2019, *Demand Response through Variable Capacity HVAC Systems in Residential and Small Commercial Applications*

1.3 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

1.3.1
absorb reactive power
operation in which reactive power is drawn by the appliance

1.3.2
air conditioner
vapour compression heating and/or cooling device designed primarily to provide conditioned air to an enclosed space, room or zone

1.3.3
appliance
electrical product
electrical device or devices that provide, or control the provision of, energy services

Note 1 to entry: Energy services include cooling, heating, motive power, energy generation and energy storage.

1.3.4
authorized
mechanism by which a person or entity is assigned the right to undertake the specified function or role

1.3.5
authorized person
person, other than the user, who is authorized by the remote agent or the supplier of the appliance to access, install or adjust parts or functions of the appliance that are not accessible to the user

1.3.6
automatic override
return to normal operation during a demand response event that is not initiated by the user or by the remote agent

Note 1 to entry: This feature is intended to address the possibility of prolonged loss of communication with the remote agent.

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1.3.7
can
indicates the existence of an option

1.3.8
certificate authority
entity that issues digital certificates certifying that a public key is owned by the nominated certificate holder

1.3.9
charging
transfer of electrical energy from the grid to an electrical energy storage system through the grid interactive port

1.3.10
circumvention device
any component that alters the demand response system operating characteristics during a test procedure, and which results in measurements that are different to how that demand response system would perform under comparable conditions in normal operation

Note 1 to entry: Component includes control, control device, software or part.

1.3.11
command
package of information originating from the remote agent that instructs the appliance how to execute operational instructions

1.3.12
consumption
flow of energy from the grid to the EESS through a grid interactive port

Note 1 to entry: The flow of energy can be used for charging and/or for other functions of the EESS.

1.3.13
demand response
DR
alteration of an appliance's operation in response to a command from a remote agent

1.3.14
demand response capability
ability of an appliance to provide demand response

1.3.15
demand response communications manager
DRCM
entity authorized by a remote agent to undertake and manage secure communications and firmware maintenance with the DRG

Note 1 to entry: The DRCM may also be the RA.

1.3.16
demand response controller
device or system of the pool pump system or EESS with the necessary interface, circuitry and components required for —

(a) receiving and interpreting operational instructions; and

(b) controlling the flow of electromagnetic energy through the grid interactive port, either directly or via the management of components of the EESS or other system

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1.3.17
demand response enabling device
DRED
device that receives commands from a remote agent and sends operational instructions to an appliance conforming to the relevant part of the AS/NZS 4755.3 series

Note 1 to entry: The requirements for a DRED are included in AS/NZS 4755.1.

1.3.18
demand response event
period between the target time to start and target time to finish operating in a demand response mode

1.3.19
demand response gateway
DRG
device or system that provides the functionality described by Section 3

Note 1 to entry: The DRG may be included in, or be separate to, the appliance.

1.3.20
demand response interface
connections and associated functions that enable an appliance to receive operational instructions from a remote agent

1.3.21
demand response mode
DRM
mode of operation within specified conditions, constraints or parameters during a demand response event

Note 1 to entry: See Table 2.1.

1.3.22
demand response system
DRS
system that automatically alters the mode of operation of an appliance in response to a signal originating from a remote agent

1.3.23
discharging
transfer of electrical energy from an EESS to the grid through the grid interactive port

1.3.24
disconnection device
device that meets the requirements of an automatic disconnection device in AS/NZS 4777.2

1.3.25
electrical energy storage system
EESS
system that stores energy that can be converted to electricity on demand

Note 1 to entry: Energy may be stored electrochemically, mechanically, thermally, kinetically and potentially.

Note 2 to entry: EESS is equivalent to electrical energy storage (EES) systems, as defined in AS/NZS 4755.3.5. The term EESS is used in this document for clarity, to distinguish it from other energy systems. “EESSs” means more than one EESS.

1.3.26
filtration pump-unit
pump-unit that pumps water through the filter of a swimming pool

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1.3.27
generate
flow of energy to the grid from the EES system through the grid interactive port that is sourced from storage, from other components of the EESS or both

1.3.28
grid
electricity distribution network

1.3.29
grid interactive port
GIP
point of connection in an EESS or other system where —

(a) electromagnetic energy can be supplied to or received from the grid;

(b) the device or network variables can be observed or measured; and

(c) the flow of electromagnetic energy can be controlled by the demand response controller

1.3.30
input energy
total energy used by a motor, controller and related accessories

1.3.31
input power
total power used by a motor, controller and related accessories

1.3.32
inverter
device that uses semiconductors to transfer power between a d.c source or load and an a.c source or load

1.3.33
inverter energy system
system comprising one or more inverters together with one or more energy sources and controls, and that conforms with the requirements of AS/NZS 4777.2

Note 1 to entry: Inverter energy systems can include batteries for energy storage.

1.3.34
may
indicates the existence of an option

1.3.35
normal operation
operation under user control

Note 1 to entry: Normal operation includes off-modes, standby modes and other modes that may be set by the user directly or by pre-programming.

Note 2 to entry: User control includes user-set timers, thermostat settings and other pre-set operating parameters.

1.3.36
operational instruction
OI
signal instructing an appliance to enter a specific demand response mode

Note 1 to entry: See Table 2.1.

1.3.37
owner
entity who may enter into an agreement with a remote agent in relation to demand response of the appliance

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1.3.38
pool equipment
ancillary equipment that is directly controlled by a pump-unit controller or whose safe operation depends on the operation of a pump-unit controller

1.3.39
protection mode
mode of operation, distinct from normal operation set by the user, that is intended to ensure the reliability or safety of the appliance

Note 1 to entry: Examples include oil recovery modes, compressor startup frequency restriction modes, defrost recovery modes, frost protection modes, and compressor operating restrictions indicated by the manufacturer in product specifications.

1.3.40
pump-unit
device that combines an electric motor and pump

Note 1 to entry: The requirements for pump-units are included in AS 5102.1.

1.3.41
pump-unit controller
device that is normally part of, or installed with, a pump-unit and which regulates the supply of mains electricity to, the pump-unit motor

Note 1 to entry: A pump-unit controller may also function as a sanitization controller or may control other pool equipment.

Note 2 to entry: The assembly attaching the electricity supply cable to a single-speed pump-unit does not constitute a pump-unit controller for the purposes of this document.

Note 3 to entry: Pump-units can also control the operation or speed of the pump-unit motor.

1.3.42
rated active power for consumption
P_{CR}
nominal rated electrical active power of the EESS when consuming energy through the grid interactive port

1.3.43
rated active power for generation
P_{GV}
nominal rated electrical active power of the EESS when generating energy through the grid interactive port

1.3.44
rated capacity
nominal rated capacity of the air conditioner model determined as follows, as applicable:

(a) *rated total cooling capacity* — As claimed by the manufacturer in accordance with AS/NZS 3823 for temperature condition T1 (units: W or kW)

(b) *rated heating capacity* — As claimed by the manufacturer in accordance with AS/NZS 3823 for temperature condition H1 (units: W or kW)

1.3.45
reactive power
product of the apparent power and the sine of the angle (φ) between the fundamental voltage and the fundamental current

Note 1 to entry: Reactive power is absorbed from the grid when the inverter acts as an inductive load from the perspective of the grid. Reactive power is supplied to the grid when the inverter acts as a capacitive load from the perspective of the grid.

Note 2 to entry: Reactive power is referred to as Q and the SI unit is volt ampere reactive, written as var.

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1.3.46
reactive power control capability
ability to supply or draw reactive power

1.3.47
registration authority
network authority that verifies user requests for digital certificates

Note 1 to entry: A role of a registration authority can be to instruct third parties, such as a certificate authority, to issue digital certificates.

1.3.48
remote agent
RA
person, organization or entity, other than the user or owner, who is —

(a) authorized by the owner or representative to initiate demand response by transmitting commands, including operational instructions, in accordance with this document; and

(b) responsible for secure communications with the appliance.

Note 1 to entry: Examples include electricity distributor, electricity retailer, electricity system manager and demand response aggregator.

Note 2 to entry: The remote agent will generally have a contractual relationship with the user or owner in which the user or owner gives prior consent for the remote agent to initiate demand response under agreed conditions.

Note 3 to entry: The RA can also perform the role of the DRCM.

1.3.49
reset
operation that returns all configurable settings, records and logs to their default values

1.3.50
response time
time interval between the target start time of an operational instructions and initiation of the instructed DRM

1.3.51
run-time adjustment
capability of a pump-unit controller to adjust the duration or start of scheduled on-time following a demand response event

1.3.52
sanitization controller
device that controls the operation of a sanitizing device

Note 1 to entry: Sanitizing devices include chlorine generators, liquid chlorine pumps and dry chlorine dispensers.

Note 2 to entry: A sanitization controller may also function as a pump-unit controller.

1.3.53
scheduled off-time
period when the pump-unit would be off in normal operation

1.3.54
scheduled on-time
period when the pump-unit would be on in normal operation

1.3.55
separate pump-unit controller
pump-unit controller that is separate from the pump-unit and is intended for or capable of separate sale

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1.3.56
shall
indicates that a statement is mandatory

1.3.57
should
indicates a recommendation

1.3.58
standby power
power consumed by the appliance at times when it is connected to the mains but is not performing its main function

1.3.59
supply reactive power
operation in which reactive power is supplied by the appliance

1.3.60
user
person or entity that normally regulates the operation of the appliance

1.3.61
user override
capability for the user to suspend an operational instruction (equivalent to manual override)

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