

WEM Procedure: DER Register Information

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Approved for distribution and use by:

Approved by: Kate Ryan

Title: Executive General Manager, Western Australia & Strategy

Date: DD December 2022

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Australian Energy Market Operator Ltd ABN 94 072 010 327

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IMPORTANT NOTICE – EXPLANATORY NOTES

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Contents

1. Introduction	4
1.1. Purpose and scope	4
1.2. Definitions	4
1.3. Interpretation	5
1.4. Related documents	6
2. DER Register	6
3. Information held in the DER Register	7
3.1. DER Generation Information	7
3.2. Additional Information	7
4. Submissions and review of DER Register Information	7
4.1. New or Modified DER Generation Information	7
4.2. Local Network Requirement Variations	8
4.3. Historical DER Generation Information	9
4.4. Assessing the accuracy of information	9
5. Storage	10
6. Access to DER Register Information	10
7. Reporting	10
7.1. DER Register Report	10
7.2. Load forecasting and other processes	10
Appendix A. DER Register Data Model	11
Appendix B. Historical DER Generation Information	27
Appendix C. DER Register Report	31
Appendix D. Measurements Abbreviations Table	32
Appendix E. Relevant clauses of the WEM Rules	33

Tables

Table 1	Definitions	4
Table 2	Related documents.....	6
Table 3	DER Register Standard Set of Variables	31
Table 4	Measurement abbreviations and definitions.....	32
Table 5	Relevant clauses of the WEM Rules	33

Figures

Figure 1	Depicts the DER Register data model levels.	11
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1. Introduction

1.1. Purpose and scope

- 1.1.1. This WEM Procedure: DER Register Information (Procedure) is made in accordance with AEMO's functions under clause 2.1A.2(h) of the Wholesale Electricity Market Rules (WEM Rules).
- 1.1.2. The *Electricity Industry Act 2004*, the WEM Regulations and the WEM Rules prevail over this Procedure to the extent of any inconsistency.
- 1.1.3. In this Procedure, where obligations are conferred on a Rule Participant, that Rule Participant must comply with the relevant obligations in accordance with clause 2.9.7A or 2.9.8 of the WEM Rules, as applicable.
- 1.1.4. The purpose of this Procedure is to specify:
- details of the DER Generation Information that Network Operators must provide to AEMO under clause 3.24.3 and 3.24.5, including any minimum size of Small Generating Units or Storage Works for which a Network Operator is required to provide DER Generation Information;
 - when Network Operators must provide and update DER Generation Information;
 - how DER Generation Information should be provided to AEMO by Network Operators, including, for example, the format in which the information must be provided;
 - how the information in the DER Register is stored by AEMO;
 - the manner and form in which AEMO will publish details, in accordance with clause 3.24.7, on the extent to which DER Register Information has informed its load forecasts or its function for ensuring that the SWIS operates in a secure and reliable manner;
 - details of how AEMO will provide Network Operators with access to DER Register Information under clause 3.24.14; and
 - the contents, form and timing of the DER Register Report to be published by AEMO in accordance with clause 3.24.12 and how the DER Register Information to be included in that report will be aggregated [**clause 3.24.8**].
- 1.1.5. Appendix E of this Procedure outlines the head of power clauses that this Procedure is made under, as well as other obligations in the WEM Rules covered by this Procedure.

1.2. Definitions

- 1.2.1. Terms defined in the *Electricity Industry Act 2004*, the WEM Regulations and the WEM Rules have the same meanings in this Procedure unless the context requires otherwise.
- 1.2.2. The following definitions apply in this Procedure unless the context requires otherwise.

Table 1 Definitions

Term	Definition
Application Programming Interface (API)	Is a software interface that allows applications to interact with each other.

Term	Definition
Connection Agreement	Refers to the technical installation requirements associated with the Network Operator's terms and conditions to connect DER equipment.
Connection Point	Means a point on a covered network identified in a contract for services as an entry point or exit point. In effect, the Connection Point is where electricity is delivered to or sent out from a point on the network. Metering infrastructure is located at the Connection Point and identified via a National Meter Identifier (NMI).
DER Register Commencement Day	The day on which the DER Register commenced, which was specified in a notice published by AEMO under clause 3.24.16 of the WEM Rules.
Electric Vehicle (EV)	Refers to motor vehicles that are powered by electricity.
Electric Vehicle Supply Equipment (EVSE)	Denotes the stationary equipment that withdraws energy from an electricity network to charge an Electric Vehicle battery.
NMI	The unique identifier assigned to a Connection Point.
Standards	Refers to the relevant technical standard or specification as published by Standards Australia.
Vehicle to Grid (V2G)	An Electric Vehicle and its associated Electric Vehicle Supply Equipment and/or other DER equipment which enables energy to be withdrawn from and injected to an electricity network.

1.3. Interpretation

1.3.1. The following principles of interpretation apply in this Procedure unless the context requires otherwise.

- (a) Clauses 1.3 to 1.5 of the WEM Rules apply in this Procedure.
- (b) References to time are references to Australian Western Standard Time.
- (c) Terms that are capitalised, but not defined in this Procedure, have the meaning given in the WEM Rules.
- (d) A reference to the WEM Rules or WEM Procedures includes any associated forms required or contemplated by the WEM Rules or WEM Procedures.
- (e) Words expressed in the singular include the plural and vice versa.
- (f) A reference to a paragraph refers to a paragraph of this Procedure.
- (g) A reference to a clause refers to a clause or section of the WEM Rules.
- (h) References to WEM Rules in this Procedure in bold and square brackets **[Clause XXX]** are included for convenience only, and do not form part of this Procedure.
- (i) Text located in boxes and headed as Explanatory Note X in this Procedure is included by way of explanation only and does not form part of this Procedure. The Procedure prevails to the extent of any inconsistency with the explanatory notes contained within it.
- (j) The body of this Procedure prevails to the extent of any inconsistency with the figures, diagrams, appendices, schedules, annexures or attachments contained within this document.

1.4. Related documents

1.4.1. The documents in Table 2 are associated with this Procedure.

Table 2 Related documents

Reference	Title	Location
WEM DER Register Technical Specification	WEM DER Register Technical Specification	WEM Website

2. DER Register

- 2.1.1. AEMO must establish, maintain and update a DER Register **[clause 3.24.1]**, which:
 - (a) must include DER Generation Information reported to AEMO by Network Operators in accordance with clause 3.24.5 of the WEM Rules and this Procedure **[clause 3.24.2(a)]**; and
 - (b) may also include information of a type similar to the information referred to in paragraph 2.1.1(a) which is provided to AEMO by any person in connection with the performance of AEMO’s functions under the WEM Rules, the Regulations or the Electricity Industry Act **[clause 3.24.2(b)]** and which AEMO has determined to include in the DER Register having regard to the matters described in paragraph 3.2.1.
- 2.1.2. Network Operators must submit DER Generation Information via AEMO’s Application Programming Interface (API) link specified in the WEM DER Register Technical Specification.
- 2.1.3. AEMO will document further technical details on the use of the API in a WEM DER Register Technical Specification to assist Network Operators in creating, updating and retrieving DER Generation Information consistent with the requirements of this Procedure.
- 2.1.4. AEMO will publish the WEM DER Register Technical Specification specified under paragraph 2.1.3 on the WEM Website.

3. Information held in the DER Register

3.1. DER Generation Information

- 3.1.1. Network Operators must provide the DER Generation Information specified in Appendix A to AEMO, in accordance with paragraph 4.1.
- 3.1.2. The minimum size of Small Generating Units of Storage Works for which a Network Operator is required to provide DER Generation Information is 0 kW.
- 3.1.3. The DER Generation Information that Network Operators were required to provide to AEMO before the DER Register Commencement Day, in accordance with paragraph 4.3, is specified in Appendix B.

3.2. Additional Information

- 3.2.1. When determining whether to include the additional information referred to in paragraph 2.1.1(b) in the DER Register, AEMO may have regard to:
 - (a) whether in AEMO's reasonable opinion the information would assist AEMO or Rule Participants to meet their regulatory obligations or requirements;
 - (b) the availability of data similar to the DER Generation Information from third parties;
 - (c) any deficiencies in the completeness or accuracy of the data received by Network Operators under paragraphs 4.1 and 4.3; and
 - (d) matters specified in clause 3.24.9(a) and 3.24.9(b) of the WEM Rules.

4. Submissions and review of DER Register Information

4.1. New or Modified DER Generation Information

E[A] Explanatory Note - Identification of the requirement to submit DER Generation Information

For the avoidance of doubt, AEMO expects that a Network Operator's awareness of requirements included in 4.1.1 can be triggered by the Network Operator's internal processes such as (but not limited to) when it collects information from electrical contractors, the involvement of its technicians in DER commissioning processes or by the identification of the injection of power (i.e. export) through an electricity meter as recorded under the Network Operator's retailer settlement function. Alternatively, the Network Operator's awareness may be triggered by an external process such as (but not limited to) receiving information from a retailer via installation completion notices or other advice from electrical contractors.

- 4.1.1. Within 20 Business Days after a Network Operator becomes aware of:
 - (a) the commissioning of a new Small Generating Unit or Storage Works;
 - (b) the commissioning of a modification to, or replacement of, an existing Small Generating Unit or Storage Works;

- (c) the decommissioning of an existing Small Generating Unit or Storage Works; or
- (d) a permanent change to any of the data specified in Appendix A in respect of a Small Generating Unit or Storage Works,

or otherwise receives DER Generation Information relating to a Connection Point on its network, the Network Operator must submit the DER Generation Information specified in Appendix A to AEMO [**clause 3.24.5**].

- 4.1.2. Network Operators must submit DER Generation Information electronically to AEMO via AEMO's Application Programming Interface (API) referred to in paragraph 2.1.2 and in accordance with this Procedure and the WEM DER Register Technical Specification.
- 4.1.3. Where a Network Operator receives an exception notification in accordance with the WEM DER Register Technical Specification, the DER Generation Information is not considered submitted for the purposes of this paragraph 4.1.
- 4.1.4. Network Operators must review and resolve the relevant exception notifications in accordance with the WEM DER Register Technical Specification.
- 4.1.5. For the purposes of this paragraph 4.1, DER Generation Information is deemed to have been submitted after it has passed the validation checks and met the criteria to be in a confirmed state as described in the WEM DER Register Technical Specification.

4.2. Local Network Requirement Variations

- 4.2.1. If local network requirements amend or override the requirements as prescribed by the relevant Standards applicable to the DER Generation Information (as set out in Appendix A) details of the requirements that differ from or are in addition to the relevant Standards must be provided to AEMO.
- 4.2.2. For the purposes of paragraph 4.2.1, Network Operators must inform AEMO and submit information specified under paragraph 4.2.1 within 20 Business Days of the requirements being applied and in accordance with this Procedure.

4.3. Historical DER Generation Information

- 4.3.1. Prior to 30 September 2020, Network Operators were required to provide AEMO with all DER Generation Information that they held in relation to the Connection Points on their network in accordance with this section 4.3 **[clause 3.24.3]**.
- 4.3.2. To satisfy the obligation in paragraph 4.3.1, Network Operators submitted to AEMO the DER Generation Information specified in Appendix B that it held for each Connection Point. The method and format for this submission was as agreed by the Network Operator and AEMO .
- 4.3.3. AEMO and a Network Operator could agree upon additional data submissions between 30 September 2020 and the DER Register Commencement Date, in order to maintain data currency and accuracy during that time, in accordance with the data specified in Appendix B.

4.4. Assessing the accuracy of information

- 4.4.1. AEMO may use any or all of the following to verify the accuracy of DER Generation Information provided by Network Operators:
 - (a) information previously submitted to the DER Register;
 - (b) information referred to in paragraphs 2.1.1(b) and 3.2;
 - (c) other information received and or held by AEMO, for example Meter Data Submissions; and
 - (d) other information provided by a Network Operator upon request by AEMO.
- 4.4.2. AEMO will notify the relevant Network Operator as soon as practicable if AEMO considers:
 - (a) any DER Generation Information provided by a Network Operator is incomplete or inaccurate, and;
 - (b) a Network Operator has failed to submit DER Generation Information under paragraph 4.1.
- 4.4.3. If at any time a Network Operator becomes aware that DER Generation information required from it under paragraph 4.1 has failed to be submitted, is incomplete, inaccurate, or no longer accurate or within 20 Business Days (or such longer period as agreed with AEMO) of receiving a notification under paragraph 4.4.2, the Network Operator must either:
 - (a) re-confirm the accuracy of the DER Generation Information previously provided; or
 - (b) submit new or updated DER Generation Information to AEMO in accordance with this Procedure.

5. Storage

- 5.1.1. The DER Register will be stored in an AEMO managed database with data encrypted at the representational state transfer API architecture (rest) and access protected with appropriate user authentication and authorisation requirements. The data will be stored with respect to each Connection Point .

6. Access to DER Register Information

- 6.1.1. Network Operators must register with AEMO to use the API in accordance with the WEM DER Register Technical Specification.
- 6.1.2. AEMO will provide access to DER Register Information via the API described in paragraph 2.1.2. and in the manner set out in the WEM DER Register Technical Specification.

7. Reporting

7.1. DER Register Report

- 7.1.1. AEMO must prepare and publish on its website a DER Register Report **[clause 3.24.12]**.
- 7.1.2. AEMO will publish the DER Register Report within three months after the DER Register Commencement Day and update it no less than quarterly.
- 7.1.3. AEMO will publish the DER Register Report in the following formats:
 - (a) aggregated data displayed on a web page; and
 - (b) aggregated data that can be downloaded in a csv format.
- 7.1.4. The DER Register Report contains information related to the variables detailed in Appendix C.
- 7.1.5. AEMO will only publish data in the DER Register Report where AEMO, acting reasonably, determines there are sufficient numbers in the aggregated data group to ensure that the risk of such publication does not result in a breach of privacy and confidentiality requirements **[clause 3.24.13]**.

7.2. Load forecasting and other processes

- 7.2.1. AEMO will document and publish on the WEM Website details of the extent to which DER Register Information has informed AEMO's development or use of load forecasts, or the performance of its functions for ensuring that the SWIS operates in a secure and reliable manner **[clause 3.24.7]**.
- 7.2.2. For the purposes of paragraph 7.2.1, AEMO may include relevant information in AEMO's Statement of Opportunities or other forecast publications.

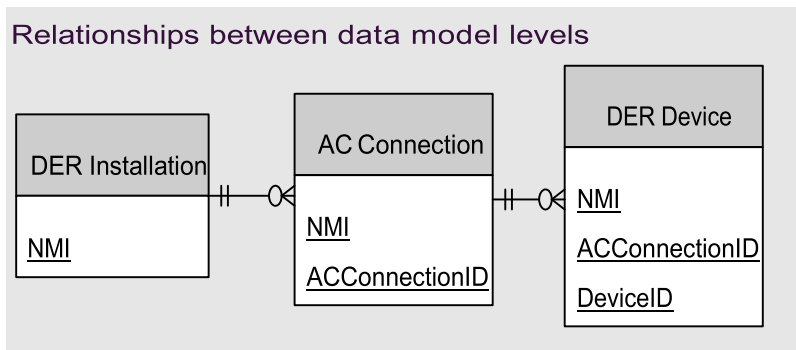
Appendix A. DER Register Data Model

This appendix specifies the DER Generation Information that must be submitted to AEMO in accordance with paragraph 4.1.

Installed DER equipment and characteristics are diverse so the DER Register is structured with three data levels such that it can receive and store DER Generation Information consistently whilst allowing for this diversity:

- **Information in Level 1** reflects the characteristics of the whole installation and any requirements imposed by the Network Operator in relation to the Connection Point. Each record held in the DER Register is identified by the NMI and a single set of Level 1 information must be provided for each record.
- **Information in Level 2** describes the equipment that interacts with the AC electrical system. As 'AC Connection' equipment can be of varied technologies Level 2 specifies the information to be provided based on the selection of the technology, activated operating modes, the Network Operator's connection requirements and (where relevant) Standards. As any Connection Point may have multiple forms of DER, the DER Register allows many AC Connections to be associated with the Connection Point.
- **Information in Level 3** describes the primary energy equipment or 'Devices' used by the Small Generating Unit or Storage Works. As each AC Connection is unique to its primary energy equipment the DER Register requires Level 3 information to be associated with its respective Level 2 information. This association is made via the ACConnectionID field which is generated by the DER Register when the record is created.

Figure 1 Depicts the DER Register data model levels.



The following provides general rules to support the interpretation of the data model.

- All data fields are mandatory to the category they are outlined to apply to and are to be submitted and/or updated in accordance with paragraph 4.1.
- Data fields categorised as optional should be provided where this information is relevant and available.
- Data field categories that are parent to sub-categories are shown in yellow with the sub-categories of data listed underneath.
- Where data fields list options, for example 'Enabled' or 'Not Enabled' or 'Yes' or 'No', a valid option must be provided.
- Where a permitted data value is not outlined in this Procedure, for example a data value range of $0 < \text{value} < 0.999$, it is detailed in the WEM DER Register Technical Specification.

Data Model Level 1 – DER Installation

Level 1 applies to all Small Generating Units and Storage Works installed at a single Connection Point in aggregate. Each DER Installation is uniquely identified by the NMI at the Connection Point. A DER Installation (Level 1) can comprise of one or more AC Connections (Level 2) with one or more DER Devices (Level 3) associated with each AC Connection (noting the associations per Figure 1).

Data Field Category	Sub-category of data	Applies to category	Description	Field Type	Mandatory (M) Optional (O)	Other comments
NMI	This is a parent category to the sub-category fields listed underneath it.	N/A	Unique National Metering Identifier allocated by the Network Operator for each Connection Point where the DER installation has been installed.	Alpha-numeric	M	
	NMI TNI	NMI	The code identifying the Transmission Node Identifier.	Alpha-numeric	M	To align with the code allocated by the Network Operator.
	NMI Status	NMI	The status of the NMI.	Text	M	The status of either Active or Extinct must be provided. <ul style="list-style-type: none"> • Active: Applies when a NMI is energised. • Extinct: Applies when the Connection Point has been permanently removed. To maintain data integrity, where a NMI becomes extinct, the Network Operator must submit a change record to change the NMI Status to extinct.

	NMI Zone Substation	NMI	The name ID of the Zone Substation to which the NMI is connected.	Alpha-numeric	M	To align with the name ID allocated by the Network Operator.
	NMI Postcode	NMI	Postcode where the NMI is installed.	Alpha-numeric	M	
Approved DER Generation Capacity	N/A	All	Approved DER generation capacity as approved by the Network Operator and as stated in the associated Connection Agreement (kVA).	Numeric	M	
DER Load Capacity	N/A	All	The DER Load Capacity (kVA). (e.g. the total load capacity of EVSE or a controllable load).	Numeric	M	
Export Limit	N/A	All	The maximum amount of power that can be exported (sent out) from the Small Generating Unit, through the Connection Point (kW).	Numeric	M	Where an export limit is applied, the Export Limit provided must be equal to or smaller than the Approved DER Generation Capacity. Where there is no export limit applied the Approved DER Generation Capacity is to be provided.
Import Limit	N/A	All	The maximum amount of power that can be imported (drawn) from the load, through the Connection Point (kW).	Numeric	M	Where an import limit is applied, the Import Limit provided must be equal to or smaller than the DER Load Capacity. Where there is no import limit applied, the DER Load Capacity is to be provided.
Installer Identification	N/A	All	Unique identifier for the installer accountable for the installation, modification or removal of the Small Generating Unit and/or Storage Works in accordance with the NMI and the associated Connection Agreement 'Job number'.	Alpha-numeric	M	This identifier must match the installer's unique qualification number which is the electrical contractor's licence number.
Connection Agreement 'Job number'	N/A	All	Unique identifier associated with the Network Operator's Connection Agreement for the approved works.	Alpha-numeric	M	This identifier is specified by the Network Operator as per its connection process. The job number must be unique for a NMI, it must not have been submitted before for a different NMI.
Number of Phases Available	N/A	All	The number of phases available for the installation of Small Generating Units and Storage Works as approved in the associated Connection Agreement.	Numeric integer	M	Either 1, 2 or 3 phases must be provided.

Number of Phases with DER Installed	N/A	All	The number of phases that the Small Generating Unit and/or Storage Works is installed on, consistent with the Network Operator's technical requirements.	Numeric integer	M	Either 1, 2 or 3 phases must be provided.
Islandable Installation	N/A	All	For identification of Small Generating Units and/or Storage Works designed with the ability to operate in an islanded mode, or as an uninterruptible power supply.	Text	M	Either Yes or No must be provided.
Central Protection and Control	This is a parent category to the sub-category fields listed underneath it.	All	For installations where the Network Operator specifies the need for additional forms of protection.	Text	M	Used to identify the installation of central protection for the DER Installation where additional forms of protection are required as per the sub categories below. Either Yes or No must be provided. Note: This selection and subsequent information should be consistent with the Network Operator's technical requirements for connection as applied at the Connection Point (for example, for Small Generating Units greater than 30 kVA).

The below protection and control sub-category data fields are to capture the different categories of central protection in use for Small Generating Units and Storage Works. Where the Network Operator has required the Small Generating Unit or Storage Works to install central protection equipment, and subsequently provided "Yes" for Central protection and control, the relevant protection and control sub-category data field(s) must be provided.

Note that where "Yes" is provided for Central protection and Control at least one sub-category must be provided.

	Under-frequency protection (F<)	If 'Central Protection and Control' = Yes, the relevant protection sub-category field(s) must be provided.	Protective function frequency trigger (Hz).	Numeric	M	As described in the Network Operator's technical specifications, or as otherwise applied by the Network Operator to the Small Generating Unit or Storage Works.
	Under-frequency protection delay (F<)		Trip delay time (s).	Numeric		
	Over-frequency protection (F>)		Protective function frequency trigger (Hz).	Numeric		
	Over-frequency protection delay (F>)		Trip delay time (s).	Numeric		
	Undervoltage protection (V<)		Protective function voltage trigger (V).	Numeric		
	Undervoltage protection delay (V<)		Trip delay time (s).	Numeric		
	Overvoltage protection (V>)		Protective function voltage trigger (V).	Numeric		
	Overvoltage protection delay		Trip delay time (s).	Numeric		

	(V>) Rate of Change of Frequency (RoCoF)		Rate of change of frequency trip point (Hz/s).	Numeric		
	Voltage vector shift		Trip angle (Deg.)	Numeric		
	Inter-trip scheme		Description of the form of intertrip (e.g. "from local substation").	Text		
	Sustained over voltage		Protective function voltage trigger (V).	Numeric		
	Sustained over voltage delay		Trip delay time (s).	Numeric		
	Neutral Voltage Displacement		Trip voltage (V)	Numeric		
	Other			Text		Where relevant, provide details which describe other types of protection settings applied by the Network Operator to the Small Generating Unit or Storage Works that are not listed in the above sub categories.
Comments		All	Comments text.	Text	O	Additional free text area to provide any relevant comments in relation to the DER Installation Level 1 information.

Data Model Level 2 – AC Connection

Level 2 applies to the equipment that interacts with the AC electrical system at each Connection Point (identified by the NMI) as described by the Level 1 information. Many 'AC Connections' can be recorded in association with each NMI and each AC Connection record must have at least one DER Device (Level 3) associated with it.

Where more than one unit of DER Equipment is installed and each unit has identical attributes, most of the Level 2 information can be provided once, with the DER Equipment Unit Count used provided to describe the combined installation. The only exception to this is the Serial Number which must be provided for each individual DER Equipment Unit. Alternatively, a unique AC Connection record can be provided for each unit of DER Equipment.

Data Category	Data Sub-category	Applies to category	Description	Field Type	Mandatory (M) Optional (O)	Other Comments
AC Connection ID	N/A	All	Unique identifier for each AC Connection.	Numeric integer	System Generated	AEMO system generated identifier.
Network Operator Asset Identifier	N/A	All	Unique DER asset identifier used by the Network Operator to identify the DER Equipment described by the respective Level 2 information.	Text	M	The Asset Identifier provided by the Network Operator to AEMO must align to the Asset Identifier that is used in other operational processes (for example, identifiers provided to a retailer to identify DER equipment).
DER Equipment Type	N/A	All	Identifies the type of equipment interacting with the AC electrical system.	Text	M	The equipment type must be provided as either: <ul style="list-style-type: none"> 1. Battery Storage 2. Controllable Load (e.g. hot water tanks, pool pumps, heating ventilation and air-conditioning), 3. Hybrid Inverter (e.g. DC-Coupled, Solar PV & Battery Storage/Electric Vehicle) 4. Electric Vehicle V2G (Vehicle to Grid enabled) 5. Electric Vehicle (no V2G capability) 6. Rotating Machine 7. Solar PV
DER Equipment Unit Count	N/A	All Equipment Types	The number of DER Equipment units with identical attributes.	Numeric integer	M	
Equipment Manufacturer	N/A	All Equipment Types	The name of the equipment manufacturer.	Text	M	May be aligned to available product databases, or entered as free text.

Equipment Series	N/A	All Equipment Types	The equipment series.	Text	M	
Equipment Model Number	N/A	All Equipment Types	The equipment model number.	Text	M	
Equipment Serial Number	N/A	All Equipment Types	The equipment serial number.	Alpha-numeric	M	A serial number must be provided for each individual DER Equipment unit.
Commissioning Date	N/A	All Equipment Types	The date that the equipment is commissioned.	Date	M	
Equipment Status	N/A	All Equipment Types	The equipment's operating status.	Text	M	<p>The status of Active or Decommissioned must be provided:</p> <ul style="list-style-type: none"> Active: Equipment that is physically installed and operating. Decommissioned: Equipment that is no longer operating. <p>To maintain data integrity, when equipment is decommissioned, the Network Operator must submit a record update to change the Equipment Status to Decommissioned.</p>
Equipment Injection Capacity	N/A	If Equipment Type = 1. Battery Storage or 3. Hybrid Inverter or 4. Electric Vehicle V2G or 6. Rotating Machine or 7. Solar PV	The rated output power that is listed on each unit as specified by the manufacturer (kVA) that can be sent out into the AC electrical system.	Numeric	M	This value refers to the injection capacity of a single unit, a single generation rated capacity of each unique DER generation equipment.
Equipment Withdrawal Capacity	N/A	If Equipment Type = 1. Battery Storage or 2. Controllable Load or 3. Hybrid Inverter or 5. Electric Vehicle V2G	The rated consumption power that is listed on each unit as specified by the manufacturer (kW) that can be taken from the AC electrical system.	Numeric	M	This value refers to the withdrawal capacity of a single unit, a single load rated capacity of each unique DER load equipment.

		or 6. Electric Vehicle				
Electric Vehicle Supply Equipment Ownership Status	N/A	If Equipment Type = 4. Electric Vehicle V2G or 5. Electric Vehicle	The ownership status is used to identify if the Electric Vehicle Supply Equipment (EVSE) is owned for private, public or fleet use.	Text	M	The ownership status is to be provided as either: <ul style="list-style-type: none"> • Private • Public • Fleet
Authorised Agent	N/A	All Equipment Types	Where enabled, the name of the entity responsible for facilitating the control of the DER equipment.	Text	M	As defined in the Network Operator's connection and DER management requirements.
DER Management Method	N/A	All Equipment Types	Where required by the Network Operator, the method of control of the DER Equipment used by the Authorised Agent.	Text	M	Where installed, the DER management method applied to the DER Equipment (e.g. meter-based isolation, internet based).
The Standard(s) which apply to the Equipment	This is a parent category to the data sub-category field listed underneath it.	All Equipment Types	The Standard(s) the equipment is manufactured, tested and installed to comply with in accordance with the Standards in effect on the commissioning date of the equipment (e.g. communication standards, grid connection standards, supply equipment standards, inverter standards).	Text	M	The applicable Standard(s) relevant to the equipment must be provided. Examples include: <ul style="list-style-type: none"> • AS/NZS.4777.2:2015, AS/NZS.4777.2:2020, Grid connection of energy systems via inverters, inverter requirements. • IEC 62109-1, and IEC 62019-2,- Safety of power converters for use in PV systems. • IEC 61851-25:2020 – DC EV supply equipment for charging electric vehicles. • IEC 62196-6:20202 – Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles.

The Australian Standard AS/NZS.4777.2:2020 - Grid Connection of Energy Systems via Inverters came into effect from 18 December 2021 and introduced regional settings for inverter based resources, with a requirement that all new inverter based resources connected to the South West Interconnected System and commissioned from that date apply region 'Australia B' settings. Where the Network Operator provides the Region Setting as 'Australia B', AEMO will interpret the 'Australia B' settings as set and published in the Australian Standard AS/NZS.4777 applicable at the commissioning date of the equipment. Should Network Operators impose requirements onto the AC Connection equipment in addition to or in alteration of those prescribed by relevant Standards, this information must be provided to AEMO in accordance with paragraphs 4.2.1 and 4.2.2.

	Region Setting	If Equipment Type = 1. Battery Storage or 3. Hybrid or 4. Electric Vehicle V2G or 7. Solar PV	Per the Australian Standard AS/NZS.4777.2:2020 'Australia B' is the applicable region for the South West Interconnected System.	Text	M	Australia B is to be provided as the region setting applicable for the South West Interconnected System.
	Additional Network Operator Requirements	Where the 'Region Setting' is provided and additional or alterations of prescribed settings in the relevant Standard have been imposed on the AC Connection equipment.	Provide additional information to describe any Network Operator requirements that are in addition to or in alteration of prescribed settings in the relevant Standard, details must be provided.	Text	M	Requirement descriptions must include the Standard name, version, paragraph reference number, setpoint naming as referenced in the relevant Standard and the divergent set point values. Examples of variations and the level of information to be provided: <ul style="list-style-type: none"> Example 1: AS/NZS4777.2:2020, 3.3.2.3 Volt-var response mode, Vv1 = 210 V, Q at Vv1 = 20 %, Vv2 = 215 V, Q at Vv2). Example 2: AS/NZS4777.2:2020, 4.5.3 Sustained operation for frequency variations, Fllco = 49.8 Hz, Fpmax = 48.3 Hz).
<p>The following data field categories and sub-categories are as described in the Australian Standard AS/NZS4777.2:2015 – 'Grid Connection of Energy Systems via Inverter' must be provided where this Standard is relevant to the AC Connection equipment (for example for equipment commissioned prior to 18 December 2021).</p>						
V_{nom-max} (sustained Operation Overvoltage Limit)	N/A	If Equipment Type = 1. Battery Storage or 3. Hybrid or 7. Solar PV	Indicates the sustained operation overvoltage limit, when the average voltage for a 10-minute period exceeds the V _{nom-max} .	Numeric	M	As described in AS4777.2:2015, section 7.5.2.
F_{stop} (overfrequency)	N/A		Frequency (Hz) where power output is zero.	Numeric	M	As described in AS4777.2:2015, section 7.5.3.
F_{stop-CH} (under frequency)	N/A		Frequency (Hz) power input	Numeric	M	

Inverter / DRED Interaction	N/A		Indicates if the inverter is interacting with a demand response enabling device (DRED).	Text	M	Either Yes or No must be provided.
Voltage Response Mode / volt-watt response	This is a parent category to the data sub-category fields listed underneath it.	If Equipment Type = 1. Battery Storage or 3. Hybrid or 7. Solar PV	Indicates if the operating mode is enabled or not.	Text	M	As described in AS4777.2:2015, section 6.3.2.2. Either Enabled or Not Enabled must to be provided.
	V1 V2 V3 V4 P at V1 P at V2 P at V3 P at V4	If Voltage response mode / volt-watt response = Enabled	V1 to V4 in V P-at-V1 to P-at-V4 in %	Numeric Numeric Numeric Numeric Numeric Numeric Numeric	M	To be provided where volt-watt response mode is enabled.
Voltage Response Mode / volt-var response	This is a parent category to the data sub-category fields listed underneath it.	If Equipment Type = 1. Battery Storage or 3. Hybrid or 7. Solar PV	Indicates if the operating mode is enabled or not.	Text	M	As described in AS4777.2:2015, section 6.3.2.3. Either Enabled or Not Enabled must be provided.
	V1 V2 V3 V4 Q at V1 Q at V2 Q at V3 Q at V4	If Voltage Response Mode / volt-var response = Enabled	V1 to V4 in V Q-at-V1 to Q-at-V4 in %	Numeric Numeric Numeric Numeric Numeric Numeric Numeric	M	To be provided where the volt-var response mode is enabled
Reactive Power Mode	This is a parent category to the data sub-category field listed underneath it.	If Equipment Type = 1. Battery Storage or 3. Hybrid or 7. Solar PV	Indicates if the operating mode is enabled or not.	Text	M	As described in AS4777.2:2015, section 6.3.3. Either Enabled or Not Enabled must be provided.

	Fixed Reactive Power	If Reactive Power Mode = Enabled	Reactive Power. Specified in % output of the system.	Numeric	M	To be provided where the Reactive Power Mode is enabled.
Fixed Power Factor Mode	This is a parent category to the data sub-category fields listed underneath it.	If Equipment Type = 1. Battery Storage or 3. Hybrid or 7. Solar PV	Indicates if the operating mode is enabled or not.	Text	M	As described in AS4777.2:2015, section 6.3.3. Either Enabled or Not Enabled must be provided.
	Fixed Power Factor	If Fixed Power Factor Mode = Enabled	Power Factor	Numeric	M	To be provided where the Fixed Power Factor Mode is enabled.
	Fixed Power Factor Quadrant		Power Factor Quadrant. (Either 'Source' or 'Sink').	Text	M	
Power Factor Curve / Power Response Mode	This is a parent category to the data sub-category field listed underneath it.	If Equipment Type = 1. Battery Storage or 3. Hybrid or 7. Solar PV	Indicates if the operating mode is enabled or not.	Text	M	As described in AS4777.2:2015, section 6.3.4. Either Enabled or Not Enabled must be provided.
	P1	If Power Factor Curve / Power Response Mode = Enabled	Reference Point for P1 (kW)	Numeric	M	To be provided where the Power Factor Curve / Power Response Mode is enabled.
	P2		Reference Point for P2 (kW)	Numeric		
	Power Factor at P1		Power Factor	Numeric		
	Power Factor Quadrant at P1		Power Factor Quadrant. (Either 'Source' or 'Sink').	Text		
	Power Factor at P2		Power Factor	Numeric		
	Power Factor Quadrant at P2		Power Factor Quadrant. (Either 'Source' or 'Sink').	Text		

Power Rate Limit Mode / Changes in AC Operation and Control	This is a parent category to the data sub-category field listed underneath it.	If Equipment Type = 1. Battery Storage or 3. Hybrid or 7. Solar PV	Indicates if the operating mode is enabled or not.	Text	M	This mode is described in AS4777.2:2015, section 6.3.5.1. Either Enabled or Not Enabled must be provided.
	Power Ramp Rate	If Power Rate Limit Mode / Changes in AC Operation and Control = Enabled	Power Ramp Rate (%/minute)	Numeric	M	To be provided where the Power Rate Limit Mode / Changes in AC Operation and Control is enabled.
The following data field categories and sub-categories must be provided where relevant for rotating machines.						
Rotating Machine Voltage / Reactive Power Regulation	This is a parent category to the data sub-category fields listed underneath it.	If Equipment Type = 6. Rotating Machine.	Indicates if the operating mode is enabled or not.	Text	M	Either None, Voltage Droop or Fixed Power Factor must be provided.
	Voltage Set Point	If Voltage / Reactive Power Regulation = Voltage Droop	(Either % Nominal Voltage, or V)	Numeric	M	To be provided where the Rotating Machine Voltage / Reactive Power Regulation is provided as Voltage Droop.
	Voltage Set Point Unit		(Either % or V)	Text		
	Deadband		(+/- x%)	Numeric		
	Droop		(%)	Numeric		
	Base for droop		(kVA)	Numeric		
	Reactive Power Source Limit		(kVAR)	Numeric		
	Reactive Power Sink Limit		(kVAR)	Numeric		
	Fixed Power Factor	If Voltage / Reactive Power Regulation If = Fixed Power Factor	Power Factor	Numeric	M	To be provided where the Rotating Machine Voltage / Reactive Power Regulation mode is provided as Fixed Power Factor. A value of either Source or Sink is to be provided where the Rotating Machine Voltage / Reactive Power Regulation is provided as Fixed Power Factor.
	Fixed Power Factor Quadrant		Power Factor Quadrant.	Text		

Rotating Machine Ramp Rate	This is a parent category to the data sub-category field listed underneath it.	If Equipment Type = 6. Rotating Machine	Indicates if the operating mode is enabled or not.	Text	M	Either Enabled or Not Enabled must be provided.
	Power Ramp Gradient	If Ramp Rate Limit = Enabled	Power Ramp Rate (%/minute)	Numeric	M	To be provided where the Rotating Machine Ramp Rate is Enabled.
Rotating Machine Frequency Response Mode	This is a parent category to the data sub-category fields listed underneath it.	If Equipment Type = 6. Rotating Machine	Indicates if the operating mode is enabled or not.	Text	M	Either Enabled or Not Enabled must be provided.
	Frequency Deadband	If Frequency Response Mode = Enabled	(Hz)	Numeric	M	To be provided where the Rotating Machine Frequency Response Mode is enabled.
	Frequency Droop		(%)	Numeric	M	
<p>The below data categories are to provide additional information for protection equipment the Network Operator may require for the AC Connection equipment, where these are not described by other Level 2 data fields.</p>						
Rate of Change of Frequency (RoCoF)			Rate of change of frequency (Hz/s)	Numeric	M	To be provided where these schemes are applied as additional forms of protection.
Voltage Vector Shift			Trip angle (Deg.)	Numeric		
Inter-trip Scheme			Description of the form of inter-trip (e.g. "from local substation").	Text		
Neutral Voltage Displacement			Trip voltage (V)	Numeric		

Data Model Level 3 – DER Device

Level 3 applies to the DER equipment that generates, stores and/or consumes energy in relation to the Small Generating Unit or Storage Works.

As each AC Connection is unique to its primary energy equipment. The DER Register requires Level 3 information to be associated with its respective Level 2 information. Many 'Devices' can be recorded in association with each AC Connection, reflecting the reality that DER installations are generally dependent on numerous smaller individual units that are combined into a single primary energy system (e.g. a number of identical solar panels forming an array), or in the case of a hybrid inverter recorded in Level 2 different devices would be provided.

Where multiple Devices are installed with identical attributes, most of the Level 3 information can be provided once, with the number of Devices provided to describe the combined installation. In this case device attributes only need to reflect a single unit (e.g. a single solar panel), with the total system described by multiplying this by the number of devices.

Data Category	Data Sub-category	Applies to category	Description	Field Type	Mandatory (M) Optional (O)	Other Comments
AEMO Device Identifier	N/A	All	The unique identifier for a single DER device.	Numeric integer	System Generated	AEMO system generated unique device identifier.
Network Operator Asset Device Identifier	N/A	All	The unique DER Asset Device Identifier that is used by the Network Operator.	Text	O	Optional field that can be provided to AEMO to align the Asset Device Identifier used to support the Network Operator's business processes (e.g. the Asset Device Identifier that is provided to a retailer to identify the DER Device).
Device Type	This is a parent category to the data sub-category field listed underneath it.	All	Used to indicate the primary technology used in the DER Device.	Text	M	The relevant Device Type must be provided as either: <ol style="list-style-type: none"> 1. Solar PV 2. Storage (including vehicle to grid electric vehicle) 3. Controlled load (including EVSE) 4. Co- / Tri-generation 5. Liquid fuel / Gas 6. Small hydro 7. Small wind 8. Waste to energy
	Comments	All		Text	O	The comments field can be used to provide details of other types of devices which are not described in the above listing of Device Types or to provide additional comments.

Data Category	Data Sub-category	Applies to category	Description	Field Type	Mandatory (M) Optional (O)	Other Comments
Number of Devices	N/A	All Device Types	The number of DER Devices with identical attributes provided as Level 3 information.	Numeric integer	M	Used to multiply capacities to comprise the total DER Device capacity.
Manufacturer	N/A	All Device Types	The name of the DER Device manufacturer.	Text	M	May be aligned to available product databases, or entered as free text.
Model Number	N/A	All Device Types	The model number of the DER Device.	Text	M	
Device Status	N/A	All Device Types	Code used to indicate the status of the DER device.	Text	M	<p>The status of: Active or Decommissioned must be provided:</p> <ul style="list-style-type: none"> Active means a DER Device that is physically installed and operating. Decommissioned means a DER Device that is no longer actively operating. <p>To maintain data integrity, when a device is decommissioned the Network Operator must submit a record update to change the Device Status to Decommissioned.</p> <p>The Device Status must be updated to Decommissioned if Equipment Status at the AC Connection Level 2 linked to it has been decommissioned.</p>
Nominal Rated Generation Capacity	N/A	If Device Type = 1.Solar PV or 4.Co / Tri-generation or 5.Liquid fuel / Gas or 6..Small hydro or 7. Small wind or 8. Waste to energy.	Maximum generation capacity in kVA that is listed in the product specification by the manufacturer. This refers to the generation or injection capacity of each generation unit or battery within the DER Device group.	Numeric	M	This value refers to the injection capacity of a single device, with the total DER Device capacity derived by multiplying this figure by the number of DER Devices.

Data Category	Data Sub-category	Applies to category	Description	Field Type	Mandatory (M) Optional (O)	Other Comments
Nominal Rated Load Capacity	N/A	If Device Type = 3.Controlled load.	Maximum load capacity in kW that is listed in the product specification by the manufacturer. This refers to the load or withdrawal of each load within the DER Device group.	Numeric	M	This value refers to the load capacity of a single DER Device, with the total DER Device capacity derived by multiplying this figure by the number of DER Devices.
Nominal Storage Capacity	N/A	If Device Type = 2.Storage	Maximum storage capacity in kWh that is listed in the product specification by the manufacturer. This refers to the capacity of each storage module within the DER Device group.	Numeric	M	This value refers to the storage capacity of a single battery, with the total DER Device storage capacity derived by multiplying this value by the number of DER Devices.

Appendix B. Historical DER Generation Information

In accordance with paragraph 4.3, this appendix describes the DER Generation Information which was required to be provided by 30 September 2020.

Data Model Level 1 – DER Installation

Category of data	Sub-category of data	Applies to category	Description	Field Type	Other Comments
NMI	N/A	N/A	Unique identifier for each Connection Point where DER Installation is.	Alpha-numeric	
	NMI TNI	NMI	Transmission Node Identifier	Alpha-numeric	
	NMI status	NMI	Status of the NMI (Either 'Active', 'Inactive' or 'Extinct')	Text	For bulk upload, if not provided, default value = Active
	NMI zoneSubstation	NMI	ID of Zone Substation to which the NMI is connected	Alpha-numeric	
	NMI postcode	NMI	Postcode where the NMI is installed	Alpha-numeric	
Connection Agreement 'Job number'	N/A	N/A	Unique identifier associated with the Network Operator's connection offer/agreement for the approved works.	Alpha-numeric	This identifier is specified by the Network Operator as per its connection process. For bulk upload, if not provided, default value = last 5 digits of NMI
Approved capacity	N/A	N/A	Approved Small Generating Unit and/or Storage Works capacity as agreed with Network Operator in the connection agreement (kVA).	Numeric	Can be distinct or equal to an export limitation. For bulk upload, if not provided, default value = sum of nominal rated and storage capacity of the devices
Number of phases available	N/A	N/A	The number of phases available for the installation of Small Generating Units and Storage Works (Either 1, 2 or 3).	Numeric integer	For bulk upload, if not provided, default value = 1
Number of phases with DER installed	N/A	N/A	The number of phases that the Small Generating Unit and/or Storage Works is installed on (Either 1, 2 or 3).	Numeric integer	For bulk upload, if not provided, default value = 1

Category of data	Sub-category of data	Applies to category	Description	Field Type	Other Comments
Islandable Installation	N/A	N/A	For identification of Small Generating Units and/or Storage Works designed with the ability to operate in an islanded mode. (Either 'Yes' or 'No').	Text	If value of 'No' is provided, this can mean 'No' or 'Unknown' For bulk upload, if not provided, default value = No
Central protection and control	N/A	N/A	For installations where Network Operators specify the need for additional forms of protection above those inbuilt in an inverter. (Either 'Yes' or 'No').	Text	Used to describe the type(s) of central protection to be applied to the DER Installation as below. For bulk upload, if not provided, default value = No

Data Model Level 2 – AC Connection

Category of data	Sub-category of data	Applies to category	Description	Field Type	Other Comments
AC Connection ID		All	Unique identifier for each AC Connection or Group in a DER Installation (15 digit).	Numeric integer	System generated identifier.
NSP Connection ID		All	An AC Connection identifier used by the Network Operator internally, Network Operators can use this field to link their internal ID with AEMO's generated AC Connection ID.	Text	Optional field that can be used to support Network Operator business processes.
Number of AC Connections			Number of AC Connections in the group. For the suite of AC Connections to be considered as a group, all of the AC Connections included must have the same attributes.	Numeric integer	For bulk upload, if not provided, default value = 1
AC equipment type		All	Indicates whether the device is connected via an inverter (and what category of inverter it is) or not (e.g. rotating machine). (Either 'Inverter' or 'Other').	Text	For bulk upload, if not provided, default value = Unknown Equipment
Commissioning date			The date that the DER	Date	Needed to monitor / manage obligation on timeframe to complete submission of record.



Category of data	Sub-category of data	Applies to category	Description	Field Type	Other Comments
			Installation is commissioned.		
Status			Code used to indicate the status of the Inverter. This will be used to identify if an inverter is active or inactive or decommissioned. (Either 'Active', 'Inactive' or 'Decommissioned')	Text	Changes to this status will be used to track activation/deactivation and decommissioning dates. For bulk upload, if not provided, default value = Active
Inverter device capacity		If AC equipment type = inverter	The rated AC output power that is listed in the product specified by the manufacturer. (kVA).	Numeric	This value refers to a single inverter rated capacity, the Number of AC Connection Fields multiplies this to calculate total AC Connection Capacity.

Data Model Level 3 – DER Device

Category of data	Sub-category of data	Applies to category	Description	Field Type	Other Comments
Device ID			Unique identifier for a single DER Device or a group of DER Devices with the same attributes. (15 digit).	Numeric integer	System generated unique Device identifier.
Number of devices			Number of devices in the group of DER Devices.	Numeric integer	
Status			Code used to indicate the status of the device. This will be used to identify if the device is active or inactive or decommissioned. (Either 'Active', 'Inactive' or 'Decommissioned')	Text	Changes to this status will also be used to track activation/deactivation and decommissioning dates.
Device Type			Used to indicate the primary technology used in the DER Device. (Either 'Fossil', 'Hydro', 'Wind', 'Solar PV', 'Renewable/Biomass/Waste', 'Geothermal', 'Storage', 'Other')	Text	Free text field is provided if 'Other' is selected. For bulk upload, if not provided, default value = Unknown Device
	Device sub-type		Used to indicate the primary technology used in the DER Device. (One of a selection dependent on device type).	Text	This field is also used to record, for example, the battery chemistry, or the type of PV panel. It is also used to record if a battery is contained in an electric vehicle connected in a vehicle-to-grid arrangement. For bulk upload, if not provided, default value = Unknown Subtype



Category of data	Sub-category of data	Applies to category	Description	Field Type	Other Comments
Nominal rated capacity		If device type = battery storage	Maximum output in kVA that is listed in the product specification by the manufacturer. This refers to the capacity of each unit within the device group (kVA).	Numeric	
Nominal storage capacity		If device type = battery storage	Maximum storage capacity in kWh. This refers to the capacity of each storage module within the device group (kWh).	Numeric	

Appendix C. DER Register Report

The standard set of variables to be considered in the DER Register Report is contained in, but not limited to, the data in Table 3 below.

Table 3 DER Register Standard Set of Variables

DER Register Standard Set of Variables
Variable (SWIS only)
Total installed DER capacity by postcode and DER Equipment Type
Number of DER installations by DER Equipment Type or Device Type
Installed DER capacity by DER Equipment Type or Device Type
Average capacity of DER by DER Equipment Type or Device Type
Installation rates (by Commissioning Date)
Completeness and/or accuracy of data provided

Appendix D. Measurements Abbreviations Table

Table 4 Measurement abbreviations and definitions

Abbreviation	Definition
kVA	Kilovoltamp
kVAr	Kilovoltamp Reactive
kW	Kilowatt
kWh	Kilowatthour
MW	Megawatt

Appendix E. Relevant clauses of the WEM Rules

Table 5 details:

- (a) the head of power clauses in the WEM Rules under which the Procedure has been developed; and
- (b) each clause in the WEM Rules requiring an obligation, process or requirement be documented in a WEM Procedure, where the obligation, process or requirement has been documented in this Procedure.

Table 5 Relevant clauses of the WEM Rules

Clause
1.3 to 1.5
2.1A.2 (h)
2.1A.2 (IC)
2.9.7A
2.9.8
3.24.1
3.24.2
3.24.3
3.24.5
3.24.6
3.24.7
3.24.8
3.24.9 (a) and (b)
3.24.12
3.24.13
3.24.14
3.24.16
4.5.11